JANUARY, 1941

Rock Products

THE INDUSTRY'S RECOGNIZED AUTHORITY

ANNUAL REVIEW ISSUE

National Defense Requirements

UNAX ROTARY KILNS
for BURNING LIME *or* CEMENT

RIVETED CONSTRUCTION or WELDED CONSTRUCTION

The UNAX KILN for burning lime or making cement clinker, operates with very low fuel consumption, producing a product of high quality and uniformity.

The UNAX COOLER is integral with the kiln, providing efficient cooling by means of the air for combustion which is preheated to a high degree.

Other FLS Auxiliaries such as the KILN CONTROL, GAS ANALYZER, CHAIN SYSTEMS, PREHEATERS, etc., aid in the effective operation of the UNAX KILN.

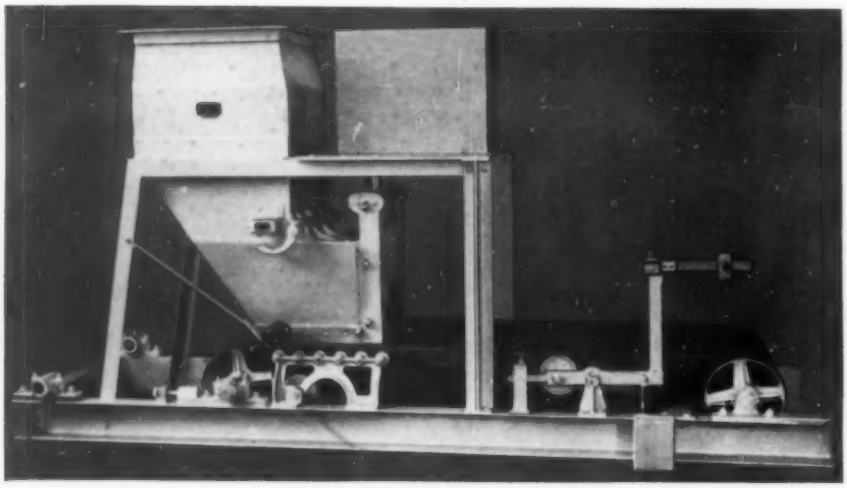
F. L. SMIDTH & CO.

60 EAST 42ND STREET — Engineers — NEW YORK, N. Y.

TN950
.A3

SCHAFFER ANNOUNCES

ELECTRICALLY CONTROLLED POIDOMETER



POIDOMETER EQUIPPED WITH
MOTOR OPERATED REGULATING GATE

This new type of gate is operated by a reversing motor and switch, controlled by a set of micro switches connected with the weighing beams. When the load on the scale platform varies from the scale setting, the weighing beam deflects from its normal horizontal position and makes contact with one of the micro switches, starting the gate in motion. The gate continues to move in the same direction (either opening or closing, depending on whether load on the scale platform is light or heavy) until proper balance is reached.

This new type Poidometer is especially recommended for material such as stone and clinker that contains cubes of various sizes. Tests have shown that exceptional accuracy is obtained when handling this type of material.

Write for Bulletin—2-A.

SCHAFFER POIDOMETER COMPANY

2828 SMALLMAN ST. PITTSBURGH, PA.

Highway To Lower Handling Costs

√ Check these LINK-BELT FEATURES for Efficient Belt Conveyor Operation

LOW COST ROUTE

One Link-Belt portable land-mounted and three 100-ft. long pontoon-mounted anti-friction belt conveyors at Shelby County Commission Penal Farm sand and gravel plant, near Memphis, Tenn. These conveyors carry overburden into worked-out pond from which sand and gravel has already been dredged. In the background is seen the Link-Belt sand and gravel preparation plant built about two years ago.

3-roll Anti-Friction Belt Conveyor Troughing Idler and Return Idler.

Positive Self-Aligning Anti-Friction Idler.

√ **1. Anti-Friction Efficiency.** Idlers are fitted with roller bearings which take high radial and thrust loads.

√ **2. Strength and Simplicity.** Riveted idler frames, strong brackets and sturdy rolls make a trouble-free assembly. No bolts or nuts to work loose.

√ **3. Ease of Lubrication.** High-pressure grease system is readily accessible and idler bearings are protected by labyrinth seals which retain grease and keep out dirt.

√ **4. Belt Protection.** Idlers are smooth with rounded edges. Narrow gap between rolls prevents pinching.

√ **5. Accurate, Balanced Rolls.** Accurate machining assures perfect alignment of bearings and uniformity of parts in the complete idlers.

The HEART of the efficient belt conveyor of today is the idler. To this all-important element, Link-Belt engineers have given continuous attention, as a result of which present Link-Belt designs offer the most in dependability and low service cost.

Get information now on better belt conveyor equipment—whether for modernization or new installation needs.

LINK-BELT COMPANY

Chicago Philadelphia Indianapolis Atlanta Dallas
San Francisco Toronto
Offices and warehouses in principal cities 8402

OTHER LINK-BELT EQUIPMENT INCLUDES: Complete Sand, Gravel and Stone Washing Plants . . . Ready-Mixed Concrete Plant Equipment . . . Lime Handling Equipment . . . Screens (vibrating, rotary and conical) . . . Washers and Classifiers, of the screw, log, flight, Shaw and conical types . . . Dewatering Rotoscoops and Screw Conveyors . . . all types of elevators and Conveyors . . . Roto-Louvre Dryers and Coolers . . . Skip Hoists . . . Car Spotters and Haulage Systems . . . Portable Conveyors and Bucket Loaders . . . Silent and Roller Chain Drives . . . Speed Reducers . . . Variable Speed Transmissions . . . Chains (Malleable Iron, Promal and Steel) . . . Sprockets . . . Elevator Buckets . . . Gears . . . Clutches . . . Couplings . . . "Friction Fighter" Self-Aligning Ball and Roller Bearing Units . . . Babbitted Bearing Units . . . Catalogs on request.

LINK-BELT

A TYPE FOR EVERY SERVICE

BELT CONVEYOR EQUIPMENT

IDLERS • TRIPPERS • BELTS • PULLEYS • BEARINGS • TAKE-UPS • DRIVES

See us at the Sand & Gravel and Crushed Stone Shows—Spaces 64 and 65

JAN 21 1941

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NEXT MONTH'S ISSUE

● Cincinnati, Ohio, is the Mecca which will draw hundreds of sand and gravel, ready mixed concrete, and crushed stone producers to the conventions of these groups at the Netherlands Plaza Hotel to be held from January 15 to 22, inclusive.

The February issue of Rock Products will contain detailed summaries of the complete convention proceedings with numerous candid "shots" of those who will attend the meetings. As it will be difficult to attend all the meetings, the editors will cover these for you so that a complete record will be available. This will be particularly valuable for those who find it impossible to be in Cincinnati this year as discussions will be made at the meetings which will be of vital concern to every producer.

Defense construction activities, possible federal government priorities involving steel and machinery deliveries and freight cars, and the status of the industries should the country be involved in war are some of the national problems which will be discussed.

Sand and Gravel

● The National Sand and Gravel Association is celebrating its Silver Anniversary, and plans to make the convention a particularly gala event which will serve to emphasize the great progress which has been made by the industry in more efficient methods and machinery.

Both the sand and gravel association and the National Ready Mixed Concrete Association will hold open forums on operating problems which proved to be so popular last year. Stanton Walker, director of engineering for both associations, has prepared an extremely interesting agenda of subjects for these meetings.

Limited space prevents the listing of these very practical topics. However, Mr. Walker will introduce the forum by a brief review on recent developments in durability studies, adhesion of bitumen to aggregates, and various specifications which will be followed by a general discussion on production problems. Every member has received an outline of discussion topics, and they are urged to study them and come prepared to enter freely into the discussion.

Ready Mixed Concrete

● A similar procedure will be followed at the open forum on operating problems conducted by Mr. Walker at the National Ready Mixed Concrete Association meetings. There will be no prepared papers and no assigned speakers, except that Mr. Walker will introduce the forum by a brief review of the principal requirements of purchase specifications and some data will be offered on methods of measuring moisture content in aggregates.

Crushed Stone

● National Crushed Stone Association has prepared a program which will emphasize the problems growing out of national defense with particular regard to highway construction, airport construction and the part W.P.A. and other government agencies are playing in the defense preparations. Separate sessions will be held of particular interest to operating men, salesmen, and agstone producers.

ROCK PRODUCTS

RECOGNIZED THE WORLD OVER AS THE LEADER IN ITS FIELD

With which has been consolidated the journals *Cement and Engineering News* (founded 1896) and *Concrete Products* (established 1918)

VOL. 44, No. 1

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Low-Cost Tonnage Rides on

MANHATTAN Conveyor and Elevator Belts

Mildew-proof, tough yet flexible, **MANHATTAN** Conveyor Belts stand up to overloads and overwork.

Wet or dry, hard or raspingly abrasive—whatever you have to move unfailingly at a steady pace, calls for **MANHATTAN** Conveyor or Elevator Belts. These two illustrated above are part of the **MANHATTAN** equipment on a large-scale operation taxed to capacity by neighboring construction work.

The Grenadier Elevator Belt is 50 ft. between centers, while the 18" Condor Conveyor Belt is 216 ft. long. With three other **MANHATTAN** Conveyor Belts, they handle 600 tons per hour, often for 16 hours and day after day. One belt runs under water continuously.

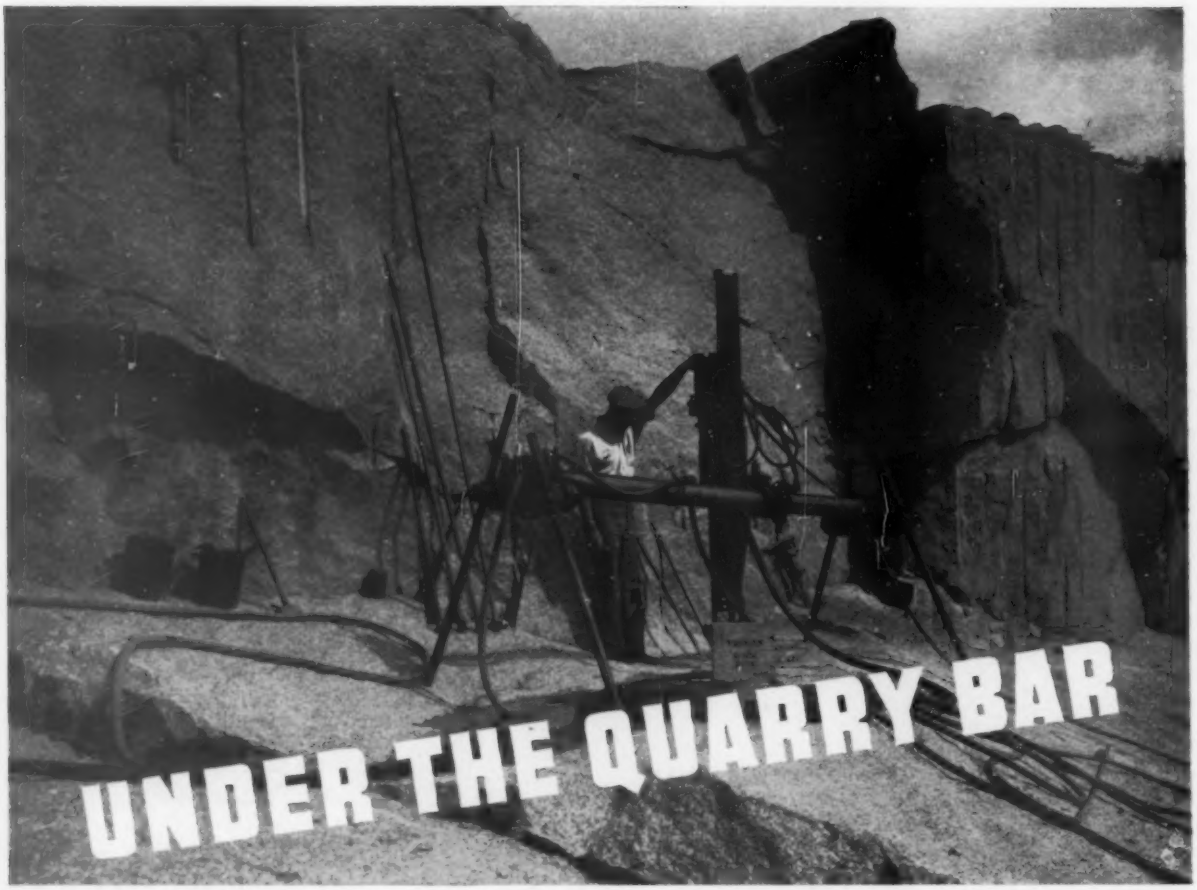
Consult **MANHATTAN** Engineers for the size and type of belt to fit the task.

Condor PRODUCTS

Compensated Belt	Sand Blast Hose
Conveyor and Elevator Belt	Suction Hose
V-Belt	Water Hose
Transmission Belt	Molded Rubber Goods
Agricultural Belting	Rubber Lined Tanks
Air Hose	Rubber Covered Rolls
Acid Hose	Chute Lining
Fire Hose	Launder Lining
Oil & Gasoline Hose	Industrial Brake Blocks and Lining
Steam Hose	
Contractors Hose	Abrasive Wheels
Hydraulic Hose	Bowling Balls

Write for Bulletin 6862 on Conveyor Belts

THE MANHATTAN RUBBER MFG. DIVISION
OF RAYBESTOS-MANHATTAN, INC.
17 Townsend Street • Passaic, New Jersey
Birmingham · Chicago · Cleveland · New Orleans · New York · Boston
Minneapolis · Detroit · Pittsburgh · Philadelphia · St. Louis · San Francisco



TIMKEN BITS DRILL CONSTANT GAUGE HOLES

The Cold Spring Granite Company of Cold Spring, Minnesota has been using TIMKEN Rock Bits a little more than a year. This operator has been obtaining on the average 24 inches per bit use. (Note there is no appreciable gauge loss in this drilling distance. Thus, an identical gauge TIMKEN Bit can be reinserted in the hole. Result, a constant gauge hole all-the-way-down.) This user regrinds each TIMKEN Bit 8 times on the average.

The economies of TIMKEN Bits in dimensional stone quarrying are threefold. 1. TIMKEN Bits drill faster and farther. 2. Customary savings from TIMKEN Rock Bit removability, such as greatly reduced steel inventory, steel handling charges, etc. 3. The ability of TIMKEN Bits to drill constant gauge holes which greatly simplify broaching and assure clean, even fractures.

If you are a dimensional stone quarry operator and are not using TIMKEN Bits, why not let us demonstrate what this widely-accepted time-tested tool will do for you. Write us for further information.

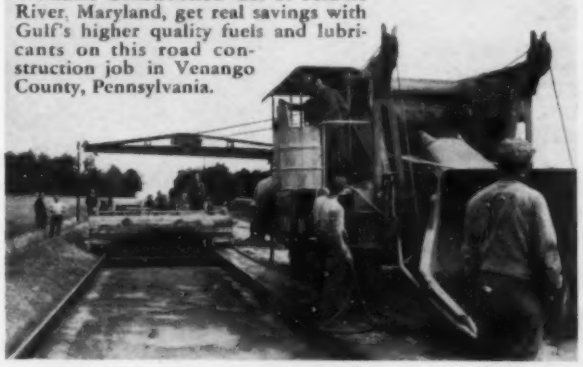
THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN
ROCK BITS

This Contractor says . . .

"GULF HIGHER QUALITY LUBRICANTS and FUELS help us keep maintenance costs at a minimum"

Williams Construction Co. of Middle River, Maryland, get real savings with Gulf's higher quality fuels and lubricants on this road construction job in Venango County, Pennsylvania.



"It costs real money to keep equipment operating on this tough job . . . that's why we stick to the GULF ENGINEER'S RECOMMENDATIONS"

"OUR fine operating record on this tough job proves that Gulf's higher quality fuels and lubricants insure efficient and economical equipment operation," says this Contractor. "We depend on GULF PERIODIC CONSULTATION SERVICE for the extra margin of lubrication efficiency that spells *'lower maintenance costs'* for us!"

Call in the Gulf Engineer before you start on your next job—let him outline the many benefits you can derive from GULF PERIODIC CONSULTATION SERVICE. Let him show you how you can get more efficient lubrication of your equipment at no additional cost! Write or phone your nearest Gulf office today.

Gulf's higher quality fuels and lubricants are quickly available to you through 1100 warehouses located in 30 states from Maine to New Mexico.

This booklet will suggest to you a practical method by which you can reduce operating and maintenance costs for your equipment. Write for your free copy.

GULF INDUSTRIAL LUBRICATION

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Please send me my copy - no charge - of the booklet "GULF PERIODIC CONSULTATION SERVICE"

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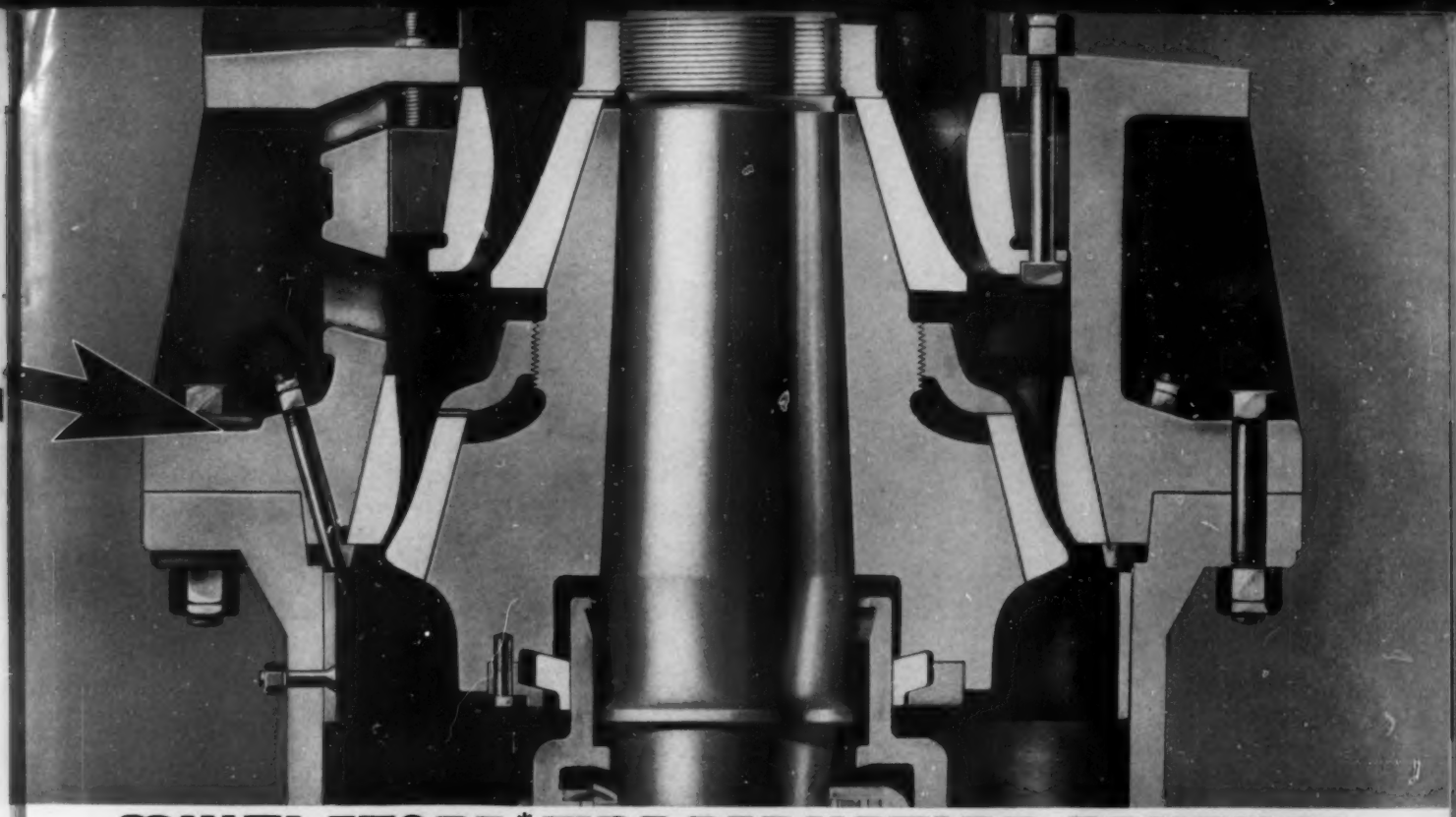
Address .....

THIS DOES THE TRICK

ANY crusher operates at maximum efficiency when the feed is of uniform size constantly supplied to full capacity. In the Traylor-Stearns Multi-Stage Fine Reduction Crusher, the Upper Stage does about 50% of the crushing desired, and, IN ADDITION, supplies the Lower Stage with exactly the right quantity of a sized feed, distributed all around its crushing chamber, to enable the latter to operate at full capacity. The adjustment of the Upper Stage is independent of that of the Lower Stage, which determines the finished size of product of the crusher.

Other Features include-

Non-Chokable at any setting
More output per horsepower
Pat'd. Bell Head and Curved Concaves
Easy Adjustment Devices
Shock Absorber Suspension
Automatic Force Feed Lubrication
Absolute Dust Exclusion
Roller Bearing Countershaft
Cast Steel Frame



MULTI-STAGE* FINE REDUCTION CRUSHER

THE BEST CRUSHER "BUY" FOR 5/16" AND LESS

●

RESULTS COUNT MOST

Following are four examples, taken at random, of results secured with 3'0" machines.

MATERIAL CRUSHED	CLOSED SETTING LOWER STAGE	TPH	HP	PER CENT THRU — SQUARE HOLES					
				¾"	½"	⅜"	¼"	10M	100M
LIMESTONE	7/16"	62	58	86	49	31	19	3	1
SANDSTONE	3/16"	68	63	97	86	69	44	20	9
GRAVEL	7/16"	67	65	90	64	47	34	14	5
TRAP ROCK	5/16"	72	55	99	67	40	21	12	8

Take particular note of the horsepower used. The product in all cases is cubical and remarkably free from slabs.

***U. S. Pat. No. 2,147,721**

SEND FOR A COPY of

BULLETIN 113

TRAYLOR

ENGINEERING & MANUFACTURING CO.

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Export Department—104 Pearl St., New York City. Foreign Sales Agencies—London—Lima—Sao Paulo—Rio de Janeiro—Buenos Aires—Santiago—Valparaiso—Antofagasta—Oruro.

SINGLE CHAIN CROWD *Power*

KOEHRING POWER . . .

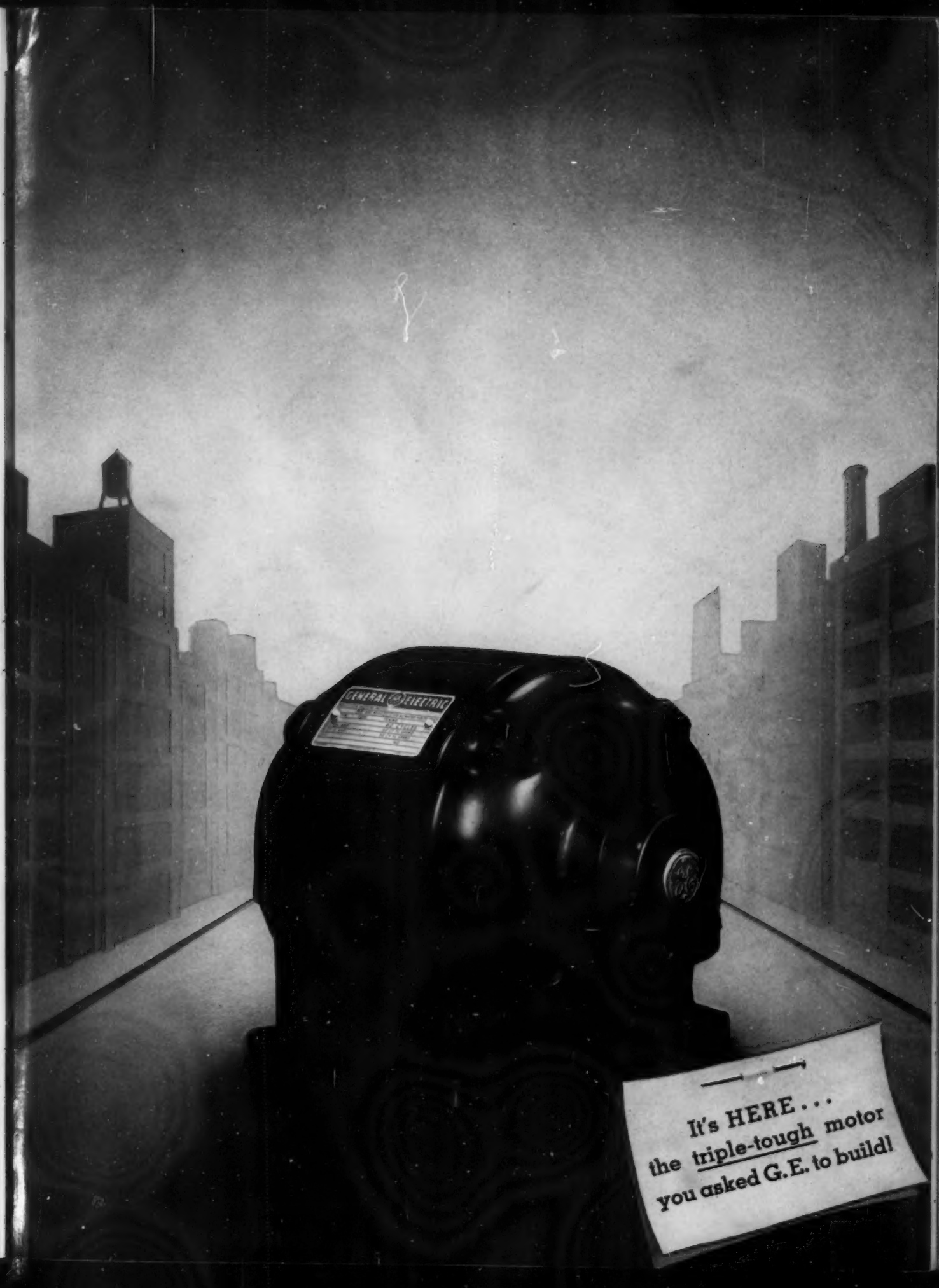
at the digging end—is transmitted to the point of action by a *single continuous* chain from the front drum to the shipper shaft sprocket. The chain travels *within the boom. Koehring Power* is applied without back lash. Chain tension is automatically maintained to assure steady power application. Crowding action is positive and absolutely independent of the pull on the hoist line. Boom can be quickly lowered or raised without manual adjustments.

. . . Single continuous crowd chain leads in straight line from boom foot to shipper shaft and front drum.

KOEHRING COMPANY
MILWAUKEE • WISCONSIN

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT


GENERAL ELECTRIC
It's HERE . . .
the triple-tough motor
you asked G.E. to build!

We combined *500* man-years with *62* years

TRI CLAD

is your answer!

The New

GENERAL ELECTRIC

POLYPHASE INDUCTION MOTOR

1, 1½, 2, and 3 hp. Larger sizes later

BUILT FOR PROTECTION FIRST

# of RESEARCH of motor EXPERIENCE

THE Tri-Clad motor is all new—and it's built to industry's own specifications. Five years of asking questions among motor users in all types of industry and studying industrial processes told us what you want in a general-purpose motor—what you want in styling—in convenience and adaptability—in extra protection on the job. At the same time, through its research and engineering organizations General Electric was developing new and unique materials, such as insulations based on synthetic resins; new manufacturing processes, such as the "booking" method of casting; and new ways of getting the most out of the active material in a motor, such as controlled annealing. Out of these new ways of doing things came the ability to build the triple-tough motor you asked for.

We call this new motor "Tri-Clad" because extra protection has been built into it in three basic ways:

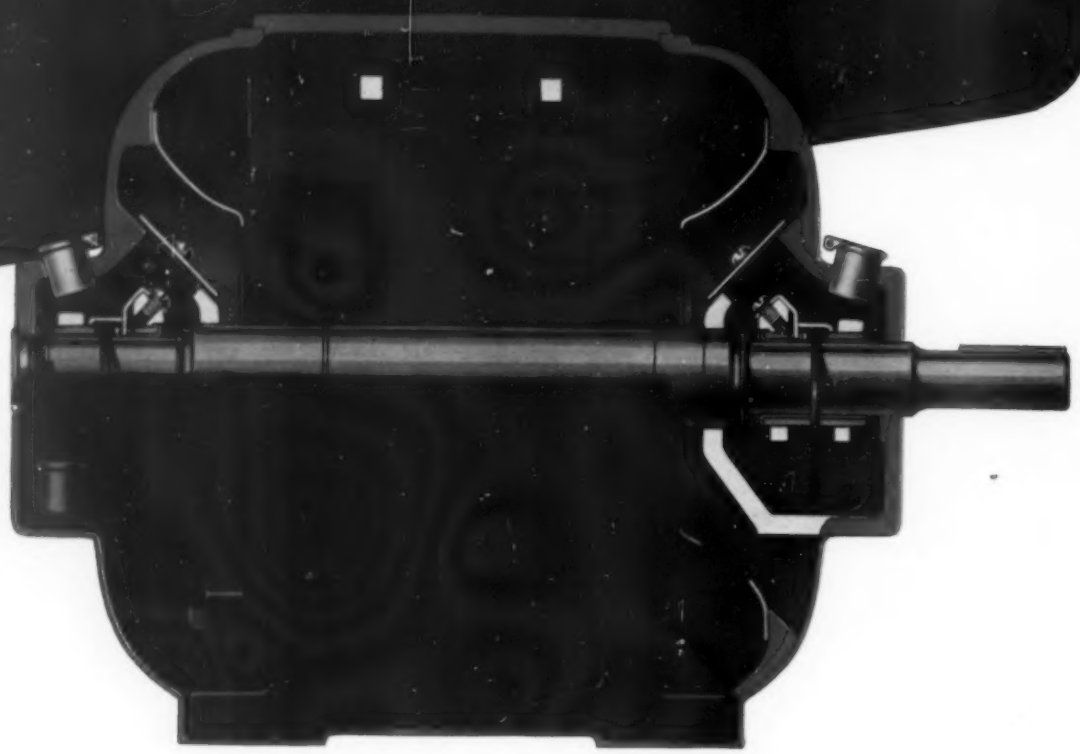
1. The sturdy, cast-iron frame and end shields with no openings above the center line protect the vital parts against physical damage. There's no chance for falling materials or dripping liquids to get inside.
2. The new motor windings of Formex* wire, together with improved insulating materials and methods, give extra protection against electrical breakdown.
3. Fundamental improvements in bearing design give extra protection against failure or excessive wear in service. A scientifically improved lubricating system and double-end ventilation augment this protection.

Here's a test: Recall every point of weakness that has ever cropped up in a general-purpose motor to cost you money. Then check them against the features listed on the next page. Don't stop with protection; consider the characteristics, the convenience features, the sleek styling—even the paint job and the name-plate. We'll rest our case for Tri-Clad on how close it *then* comes to your ideas of what a truly modern motor ought to be. *Reg. U.S. Pat. Off.

. . . TO LAST

TURN PAGE FOR INSIDE STORY

Check THIS "INSIDE STORY" OF MOTOR VALUE



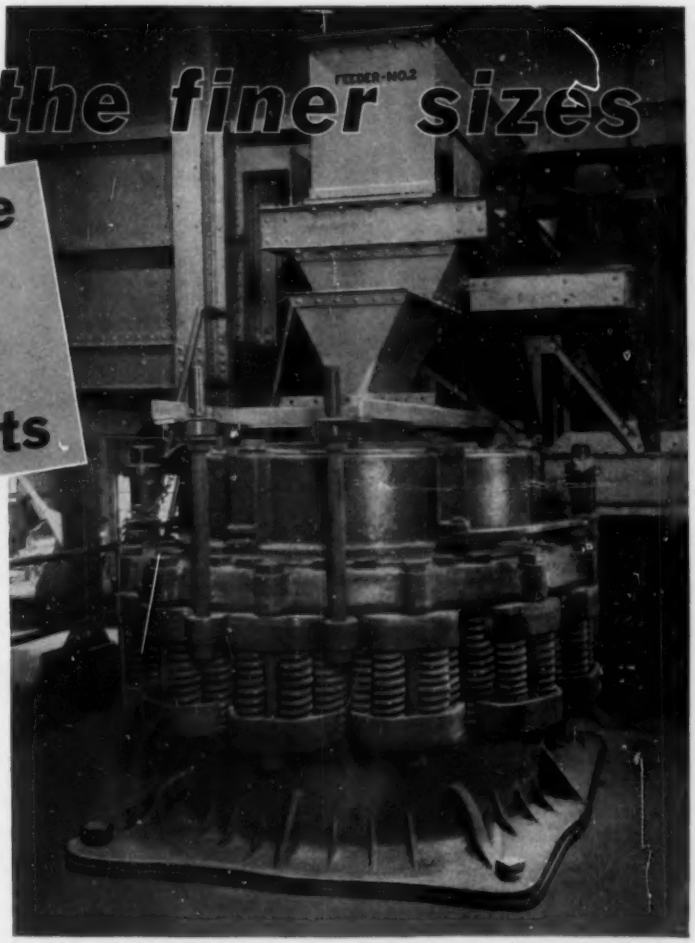
- One-piece, cast-iron frame and rigid cast-iron end shields protect the motor against external blows and accidental abuse.
- Enclosed construction protects against entry of falling objects and dripping liquids; keeps chips and the like from vital motor parts.
- Low-velocity, double-end ventilating system provided by fans cast integrally with rotor winding keeps the motor running cool and prolongs insulation life.
- New winding methods give shorter end turns, reduce the number of internal connections, and improve characteristics.
- Mounting features adding to convenience include reversible stator and four-position end shields.
- Synthetic-resin insulating varnish, with exceptional bonding strength and high resistance to heat, bonds the conductors together and prevents movement of the windings.
- Steel-shell bearing linings of hard-tin-babbitt are of fundamentally new design and have a new method of grooving which provides positive lubrication for either direction of rotation.
- New and simple ball-bearing mounting assures correct alignment and exclusion of foreign materials. Easily cleaned and regreased by means of the G-E pressure-relief system.
- Big, roomy, four-direction conduit box is quickly removed from its base to give unrestricted working space for making connections. Flexible leads are clearly marked.
- Formex wire—the toughest magnet wire yet developed—assures a continuous dielectric film under the most severe conditions. Formex is highly resistant to abrasion, moisture, varnish solvents, and heat aging.
- End windings are coated with Glyptal No. 1201 red, providing a tough, hard finish that is highly resistant to heat, moisture, oil, and abrasion.
- One-piece cast-aluminum rotor winding with fans cast integrally is practically indestructible, has no joints, and gives a cool-running low-inertia rotor.
- All laminations, both in stator and rotor, are annealed for low iron losses and uniform characteristics. Special rotor treatment improves operating characteristics.

General Electric Company, Schenectady, N. Y.

GENERAL ELECTRIC

Producing the finer sizes

Greater Tonnage
★
Lower Costs
★
Increased Profits



A four foot Symons Short Head Cone used for making a minus quarter inch limestone product.

Minus Half Inch Materials Easily Made

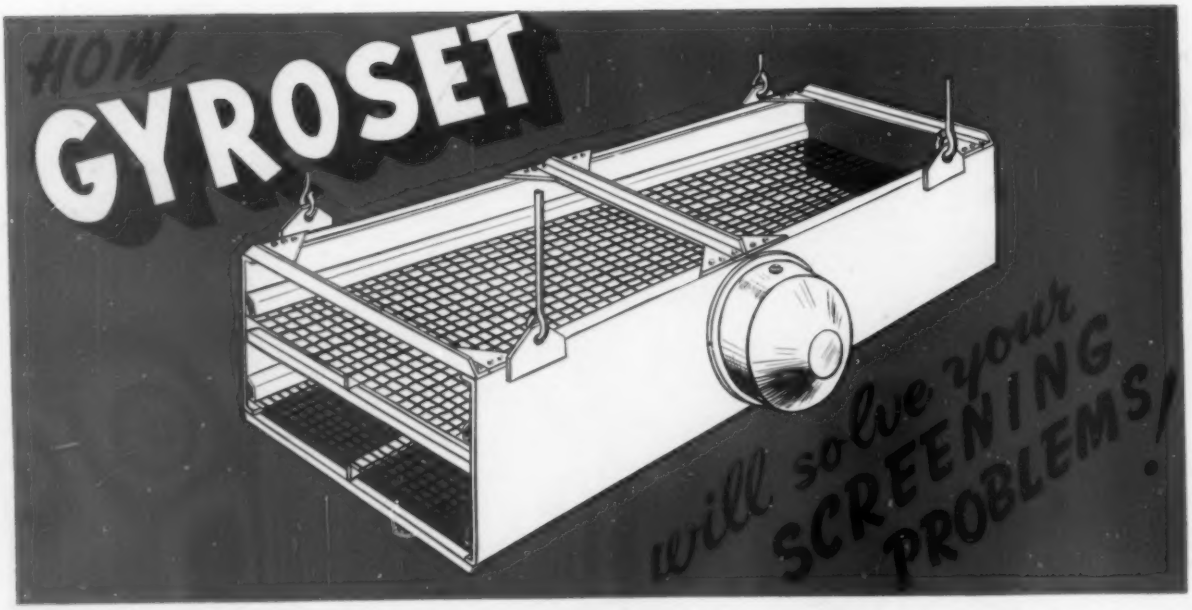
The advent of the Symons Short Head Cone marked a new era in machinery for the production of finely crushed stone, gravel, slag and similar materials. With this crusher, it is possible to produce the extremely fine sizes in far greater capacity than was formerly possible. Only such sizes need be made for which there is an actual demand. Producing sizes for which there is no ready sale is eliminated. Rehandling and stockpiling is avoided. Make the sizes you want, in the tonnage you require and at a crushing cost which will assure of more profitable plant operation. If you are faced with the problem of making minus half inch materials, the Symons Short Head Crusher will prove a profitable investment.

In addition to Short Head Crushers which are built in five sizes, Symons Standards are available in seven sizes, thus permitting the selection of size and type suitable for plants large and small.

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

New York City, 60 E. 42nd Street
Los Angeles, Subway Term. Bldg.
London, Eng., Bush House
Toronto, Concourse Bldg.

SYMONS CONE CRUSHERS

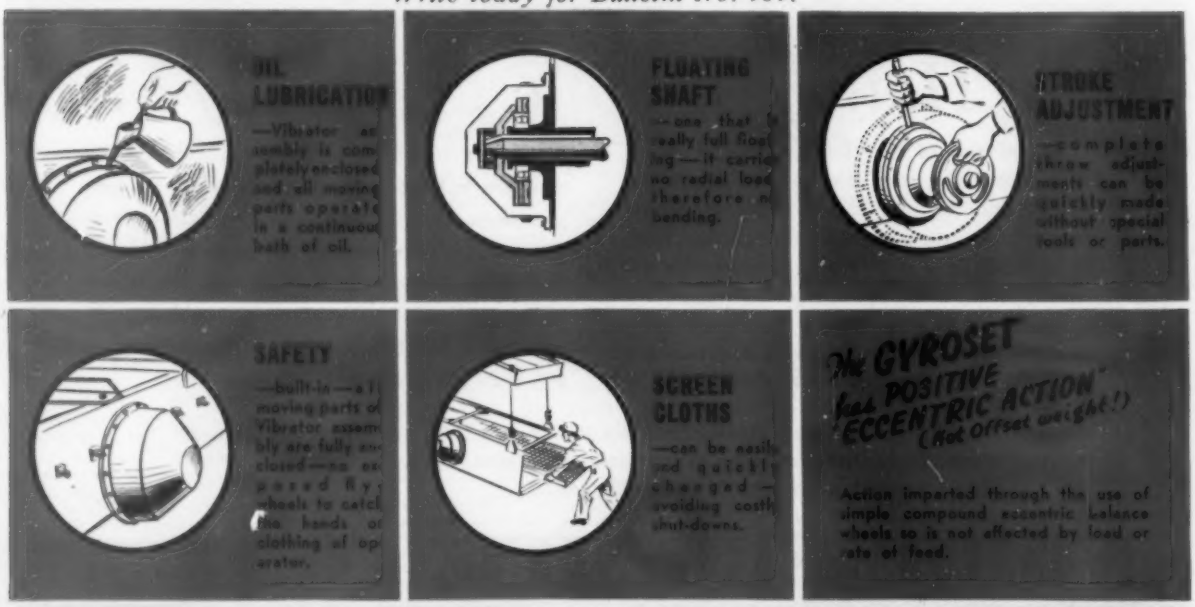


■ Here's a machine that will efficiently grade or size your material at the lowest possible cost —not only is it popularly priced but economical in operation as well.

The secret of its amazing performance is in the positive CONTROL of the vibrating action which permits a light vibration for fine material or a coarse, heavy throw for large material either wet or dry. You can adjust the machine to exactly fit the product in hand and do it easily and quickly without special tools. Available in one, two or three decks; open, semi-enclosed or fully enclosed models.

GYROSET is produced by men who have specialized in the design and manufacture of vibrating screens for years.

Write today for Bulletin No. 939.


OIL LUBRICATION
—Vibrator assembly is completely enclosed and all moving parts operate in a continuous bath of oil.
FLOATING SHAFT
—one that is really full floating—it carries no radial load therefore no bending.
STROKE ADJUSTMENT
—complete throw adjustments can be quickly made without special tools or parts.
SAFETY
—built-in—all moving parts of Vibrator assembly are fully enclosed—no exposed fly wheels to catch the hands or clothing of operator.
SCREEN CLOTHS
—can be easily and quickly changed—avoiding costly shut-downs.
The GYROSET has POSITIVE ECCENTRIC ACTION (Not Offset weight!)
Action imparted through the use of simple compound eccentric balance wheels so is not affected by load or rate of feed.

PRODUCTIVE EQUIPMENT CORP.

2926-28 WEST LAKE ST. .....CHICAGO. ILL.

MAKERS OF THE FAMOUS "JIGGER" "SELECTRO" MUD HOG" SCREENS

TRADE DEMPSTER DUMPSTER MARK — The Original BUCKETRUX

This is what many of the most successful operators are using to cut their loading and hauling costs—The All-Purpose Detachable Bucket providing the efficiency of an entire fleet with the costs of a single truck. Illustrated (top-center) is the new Model 300 LF (3 cu. yd. capacity) mounted on 117" wheelbase truck chassis. This powerful unit, like all Dempster-Dumpster units, will handle the Tilt Type and Drop-Bottom buckets (illustrated top left and right) as well as the Skip Type buckets, with equal efficiency. It can also be furnished with a combination cargo and transport body to increase its all-around flexibility. Note the large number of buckets in the background serviced by this one Hoisting Unit. One unit can serve five to ten buckets, depending on the length of haul. Special buckets engineered to meet all conditions. Investigate—Check with the operators who use them—Write us for details of our trial offer.

EXCLUSIVE FEATURES

- No High Pressure Hose
- No Counterweight
- No Auxiliary Jacks
- SIZES 1½ cu. yds. to 6 cu. yds. CAPACITIES 4500-lbs. to 12,000-lbs. net Payload.

DEMPSTER BROTHERS, INC. KNOXVILLE TENNESSEE

— DISTRIBUTORS IN PRINCIPAL CITIES —

Join the SMITH-MOBILE Parade!

PACIFIC COAST AGGREGATES, Inc. 20 Units
STEWART SAND & GRAVEL CO. 17 Units
ARUNDEL-BADDOCK CORP. 14 Units
CERTIFIED CONCRETE CO. 9 Units

Hundreds of SMITH-MOBILES are giving Satisfactory Performance on Jobs All Over the Country!

Why gamble with new and untried truck-mixers when you can get the modern SMITH-MOBILE which is backed by 10 years of research and development, plus 4 years of quantity production and actual experience in the field?

Everywhere, from coast to coast, the new SMITH-MOBILE is being heralded as the "last word" in truck mixer design. Hundreds of ready-mixed operators are changing over to SMITH-MOBILE because it's the ORIGINAL HIGH DISCHARGE truck mixer, thoroughly tried and field-tested over a long period of years and fully guaranteed by a company which has specialized in building concrete mixers since 1900.

So get on the SMITH-MOBILE band wagon. Start today by writing for your copy of Catalog 198-A just off the press.

THE T. L. SMITH COMPANY
2895 N. 32nd Street **MILWAUKEE, WIS.**

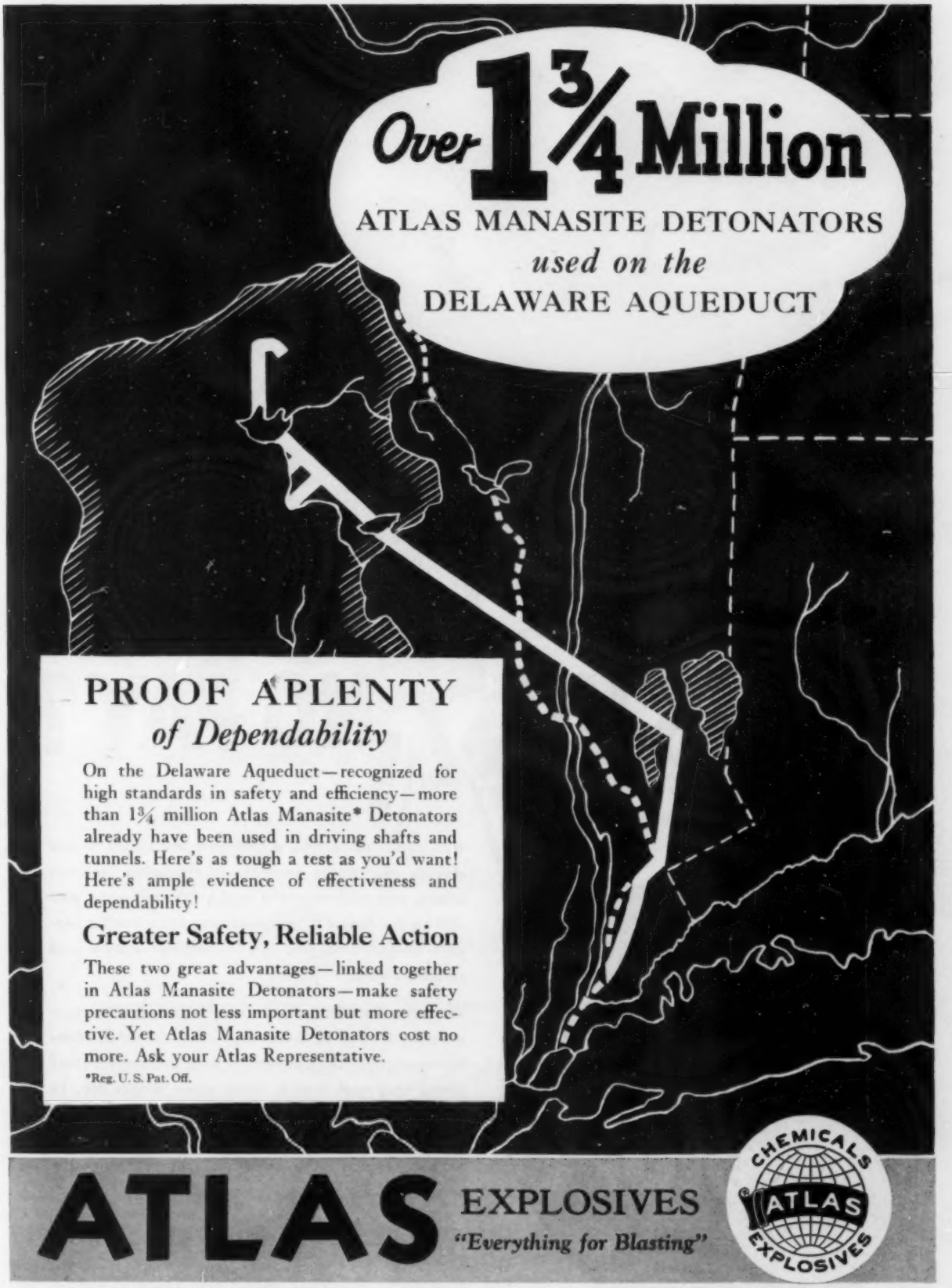
All sizes available. Illustration shows No. 5 SMITH-MOBILE (5 yards Capacity, 6 yards Agitator).

✓ Check these SMITH-MOBILE FEATURES

1. **HIGH DISCHARGE** — 27" to 34" higher than old-style truck mixers. No hoist or ramp required.
2. **CONTROLLED DISCHARGE** — pour it fast or slow. The concrete comes out in a smooth steady flow and without segregation.
3. **VISIBLE MIXING** — Open the door and look into drum while drum is revolving. Watch the mix. SEE what's going on inside.
4. **FEED CHUTE CHARGING** — Loaded on the level, no ramp needed. Easy to spot under bin.
5. **DRUM REVOLVES WHILE CHARGING**—Shrinking and mixing start instantly. Carries larger loads.
6. **NO LOADING HATCHES** to open or close. Driver can stay right in cab.
7. **NO LEAKY TROUBLESOME DISCHARGE DOOR** — Closing door on Smith-Mobile can be kept open during mixing cycle.
8. **WATER INTRODUCED THROUGH CHARGING OPENING**—for transit mixing, water nozzle located in top part of drum, well above concrete. High pressure pump furnished as regular equipment.
9. **STEEP DISTRIBUTING CHUTE FOR DRY CONCRETE** — Will spout dry concrete directly into high forms, buckets, concrete carts, etc., without pushing it down the chute.
10. **LARGER RADIUS OF SPOUT DISTRIBUTION**— Use the spout for pouring directly into forms instead of using carts or wheelbarrows.
11. **BETTER AND FASTER MIXING** — Scientifically designed T-shaped spiral blades provide a fast end-to-end movement of the aggregates.

THE *Modern* TRUCK MIXER and AGITATOR

A 3293-1P



PROOF APLENTY
of Dependability

On the Delaware Aqueduct—recognized for high standards in safety and efficiency—more than 1¾ million Atlas Manasite* Detonators already have been used in driving shafts and tunnels. Here's as tough a test as you'd want! Here's ample evidence of effectiveness and dependability!

Greater Safety, Reliable Action

These two great advantages—linked together in Atlas Manasite Detonators—make safety precautions not less important but more effective. Yet Atlas Manasite Detonators cost no more. Ask your Atlas Representative.

*Reg. U. S. Pat. Off.

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. · Offices in principal cities · Cable Address—Atpowco

DOES CHISELING PAY?

It depends upon where and how you chisel. If you devote your entire energies in shopping for price alone, you probably will find a "cheap" rope and still be the loser. If, however, you consider the per-unit-of-use cost, you are "chiseling" wisely and constructively.

Wickwire Spencer offers every assistance to rope users in producing lower rope costs. In the laboratory and mill they develop and produce better metal and rope that in itself gives longer life. In the field, trained rope experts recommend suitable types of rope and suggest rope care in use that further reduces rope costs . . . yet the purchase price of Wickwire Rope is no higher.

WICKWIRE ROPE

WICKWIRE SPENCER STEEL COMPANY

General Offices: 500 Fifth Avenue, New York City; Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City

HERCOMITE IN THE SPOTLIGHT

REG. U. S. PAT. OFF.

When an explosive shows an average saving of 15% over older types. When its wide range of bulk strengths answers the need for good breakage at low cost in all kinds of rock. When millions and millions of pounds have been used with an outstanding safety record. When it continues to replace older types because of economy, performance, and safety. It's time to take a bow. That's why Hercomite has earned a place in the spotlight.

EXPLOSIVES DEPARTMENT

HERCULES POWDER COMPANY

Incorporated

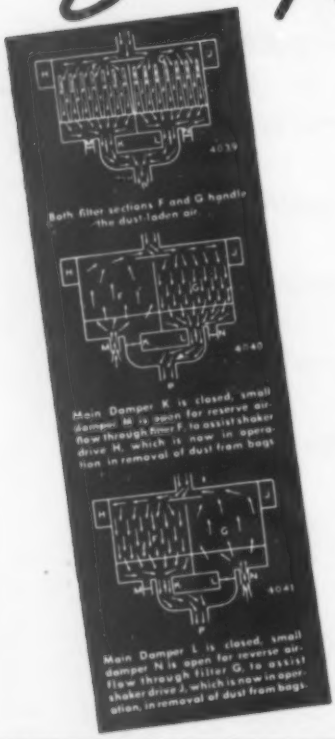
WILMINGTON • DELAWARE

D-12

● Three Sly Dust Filters Exhausting Packing Machines and Conveyors in a large Cement Plant. This firm has a number of other Sly Dust Filters.

A Better Return ON YOUR INVESTMENT

with SLY DUST CONTROL


4039
Both filter sections F and G handle the dust-laden air.
4740
Main Damper K is closed, small damper M is open for reverse air-flow through filter F, to assist shaker drive H, which is now in operation in removal of dust from bags
4041
Main Damper L is closed, small damper N is open for reverse air-flow through filter G, to assist shaker drive J, which is now in operation, in removal of dust from bags.

● Sly Dust Control Systems offer automatic control, eliminating the human element. This means greater efficiency and longer life—a better return on your investment.

And, if desired, *Continuous* Operation! In some industrial processes dust control must be continuous—*without interruption.* See diagrams at left.

Sly Dust Filters clean the air completely by *filtering* the dust out of it. They have *greater* filtering capacity per cubic foot than any other make, due to the *Special* flat cloth bag pioneered and perfected by Sly. Sly Dust Filters are not expensive. Many plants in the cement and rock products field are definitely profiting from the use of Sly Dust Control.

Ask for Dust Control Bulletin 98 and send details of your problem. There is no obligation, and Sly's experienced engineers will be glad to help you.

THE W. W. SLY MFG. CO.
4746 TRAIN AVE.
CLEVELAND, OHIO

SLY
INDUSTRIAL DUST CONTROL

NO MORE GOING 'ROUND THE MOUNTAIN

160 miles straight through seven rugged ranges of the Alleghenies on a practically level route runs the great new Pennsylvania Turnpike—the first express superhighway in America and the greatest single highway project ever attempted in the history of U. S. road building.

Motorists using this great four-lane highway save nearly 10,000 feet of vertical climb between Pittsburgh and Harrisburg. It pierces ranges with deep tunnels... slices whole mountains in two with great cuts... 160 miles of a motorist's seventh heaven without a sharp curve or a noticeable grade!

Before this road could be built more than 26 million cubic yards of rock and earth had to be moved. When you think of the magnitude of this task you can understand what a tremendously important role explosives played in its construction. For example, in Clear Ridge Cut alone—the man-made canyon shown above—more than 700,000 pounds of dynamite produced by American Cyanamid Company were used. In a single blast a charge of 42,700 pounds—over two carloads—was used to loosen 60,000 cubic yards of material.

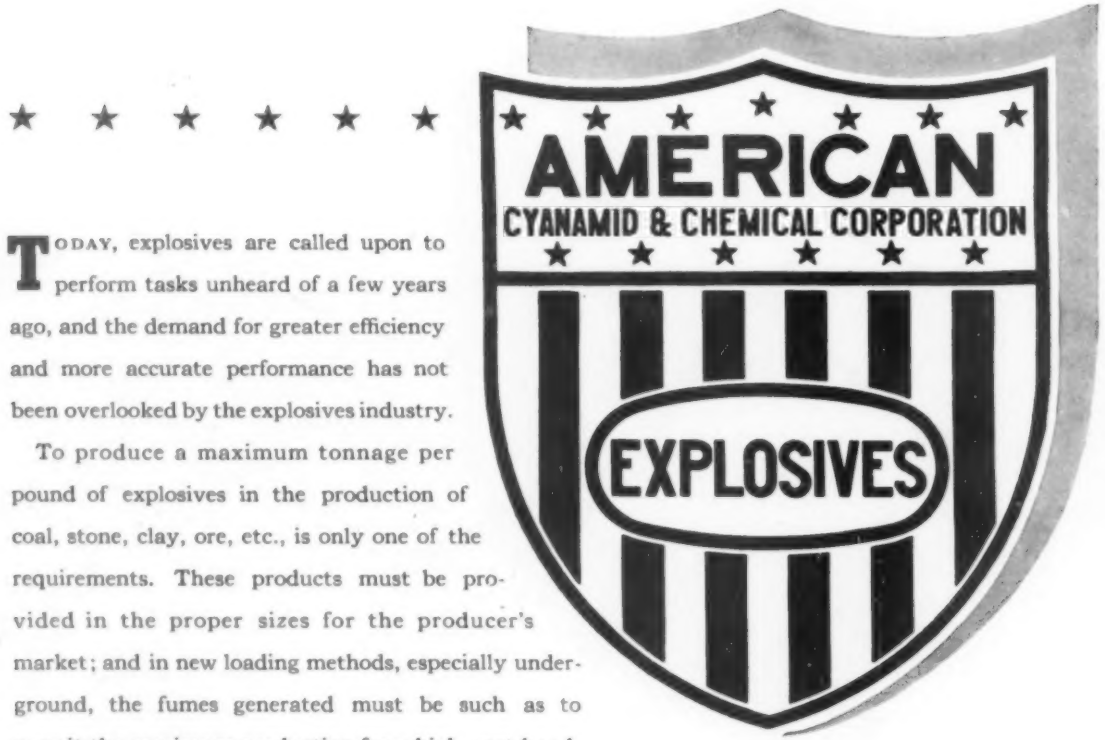
Normally considered a three- or four-year job, the Turnpike was virtually completed in 20 months. Vitally important in establishing this incredible speed record were Cyanamid blasting materials and the skillful supervision of Cyanamid explosive engineers.

Developing and producing more efficient explosives for use in mining, quarrying, road building and construction—this is just one of the many ways in which Cyanamid promotes progress and national welfare through chemicals and chemical products.

American
Cyanamid Company

30 ROCKEFELLER PLAZA, NEW YORK, N. Y.

MOLDING THE FUTURE THROUGH CHEMISTRY



TODAY, explosives are called upon to perform tasks unheard of a few years ago, and the demand for greater efficiency and more accurate performance has not been overlooked by the explosives industry.

To produce a maximum tonnage per pound of explosives in the production of coal, stone, clay, ore, etc., is only one of the requirements. These products must be provided in the proper sizes for the producer's market; and in new loading methods, especially underground, the fumes generated must be such as to permit the maximum production from high-cost handling equipment. On outdoor operations, the highest blasting efficiency must be obtained to provide steady operation of the expensive quarry plants or contractor's equipment.

To solve these problems the Explosives Department of American Cyanamid & Chemical Corporation maintains qualified research and technical staffs. Specially trained research men are constantly at work in modern laboratories developing new materials and manufacturing processes to provide high quality dynamite, blasting powder, electric blasting caps, blasting caps and all blasting accessories.

To further assist the user in obtaining maximum results from the use of these products, a corps of explosives engineers is maintained. These men are qualified by training and experience in the blasting field to select the most suitable grade of explosives and suggest efficient methods for their use.

HIGH EXPLOSIVES
PERMISSIBLES
BLASTING POWDER
BLASTING ACCESSORIES

American Cyanamid & Chemical Corporation

A Unit of American Cyanamid Company

30 ROCKEFELLER PLAZA • NEW YORK, N. Y.

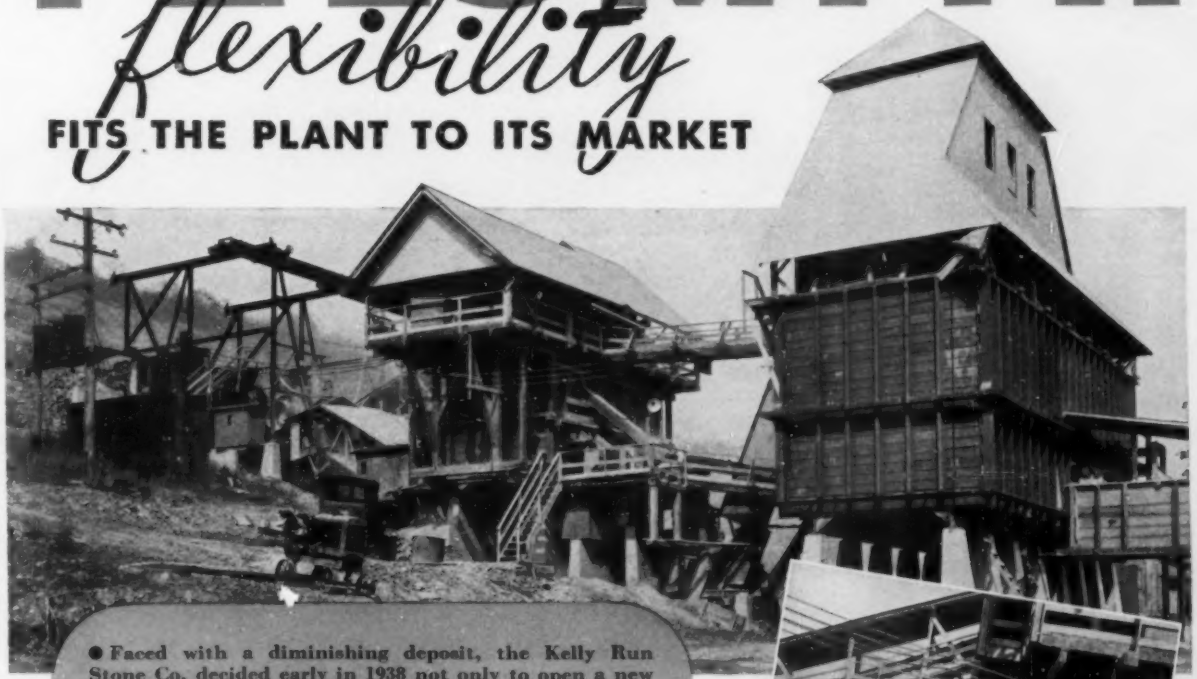
EXPLOSIVES DEPARTMENT

SALES OFFICES: Pittsburgh, Pa. Bluefield, West Va. Scranton, Pa. St. Louis, Mo. Chicago, Ill. Pottsville, Pa. Hazleton, Pa. Maynard, Mass.

TELSMITH

flexibility

FITS THE PLANT TO ITS MARKET



● Faced with a diminishing deposit, the Kelly Run Stone Co. decided early in 1938 not only to open a new quarry higher on South Mountain but to erect a completely new 125-150-ton-per-hr. rock crushing plant about six miles southeast of Wilkes-Barre, Pa.

Their well established market demanded products to suit widely varying specifications. This called for a plant of extreme flexibility. They have just that. Its design and construction was supervised by their Gen. Mgr., B. C. Banks, with Telsmith's engineering co-operation.

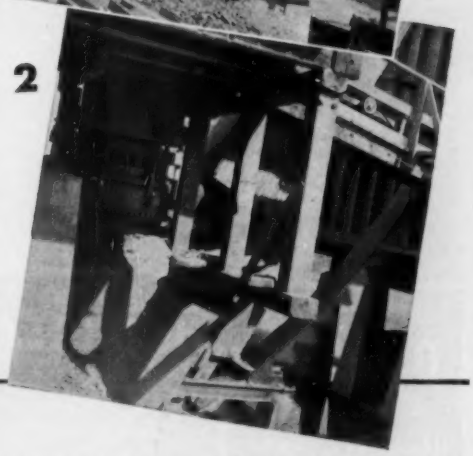
In large part this plant's flexibility is due to its Telsmith equipment. The 72" x 25' Telsmith Roller Bearing Rotary Scalping Screen insures quality grading and cleanliness. Plus 4" rock or tailings from scalper are chuted to the 13-B Telsmith Gyratory Secondary Crusher (Fig. 1) and its product in turn goes back to the scalper. Thus either ballast or modified base course stone may be produced in the scalping bin and trucked from there. The "parallel pinch" of the Telsmith Gyratory quickly reduces large pieces at top of bowl. Operating at an eccentric speed of about 220 rpm, its capacity is high. And its super-strong steel frame and crown and unbreakable shaft insure continuous output.

A No. 36 Telsmith Gyrasphere Crusher (Fig. 2) serves as a finishing crusher, taking raw feed from scalping bin, also tailings and unwanted sizes from main bin. By varying percentage of feed and crusher's settings, proportions are controlled and various sizes in the amounts needed are produced.

Finishing screens are two 4'x10' Telsmith Double Deck Pulsators, each delivering 3 sizes to main bin compartments on each side of elevator—6 possible sizes in all.

Do you want flexibility in your plant, with low-cost operation and maintenance? Write for Bulletin Q-11.

1



2

SMITH ENGINEERING WORKS, 508 EAST CAPITOL DRIVE, MILWAUKEE, WISCONSIN

Cable Addresses: Sengworks, Milwaukee—Concrete, London

50 Church St. New York City | 211 W. Wacker Drive Chicago, Ill. | 713 Commercial Trust Bldg. Philadelphia, Pa. | 81 Binney St. Cambridge, Mass. | Vam Wheeler Eqpt. Co. Columbus, Ohio | Brandeis M. & S. Co. Louisville, Ky.

Charleston Trac. & Eqpt. Corp. Charleston, W. Va. | Roanoke Trac. & Eqpt. Co. Roanoke, Va. | Choctaw C. & M. Co. Memphis, Tenn. | Wilson-Weesner-Wilkinson Co. Knoxville and Nashville, Tenn. | United Steel Sales Toronto, Ont.

GENERAL

gives you More of the things necessary to maintain high production, as it is doing here for Hannaman & Burroughs of Salisbury, Md. The machine is unloading stone at Berlin, Md., for a new road near Ocean City.

MORE ROCK— MORE HIGHWAYS

This GENERAL Model 307 Clamshell Crane is going right down the line of cars, keeping trucks and cars on the move.

Let the GENERAL help you keep material on the move.

The **OSGOOD** COMPANY

Sizes: ½ to 2½ Cu. Yd.

Diesel - Oil - Gas - Electric

Associated with The GENERAL EXCAVATOR CO.

The **HERCULES** COMPANY

HERCULES "IRONEROLLERS"

6 to 12 Tons

Diesel or Gasoline

Associated with The GENERAL EXCAVATOR CO.

GENERAL

OSGOOD MARION OHIO U.S.A. GENERAL HERCULES

Sizes:

⅜-½-⅝-¾ Cu. Yd.

Diesel—Gas—Electric

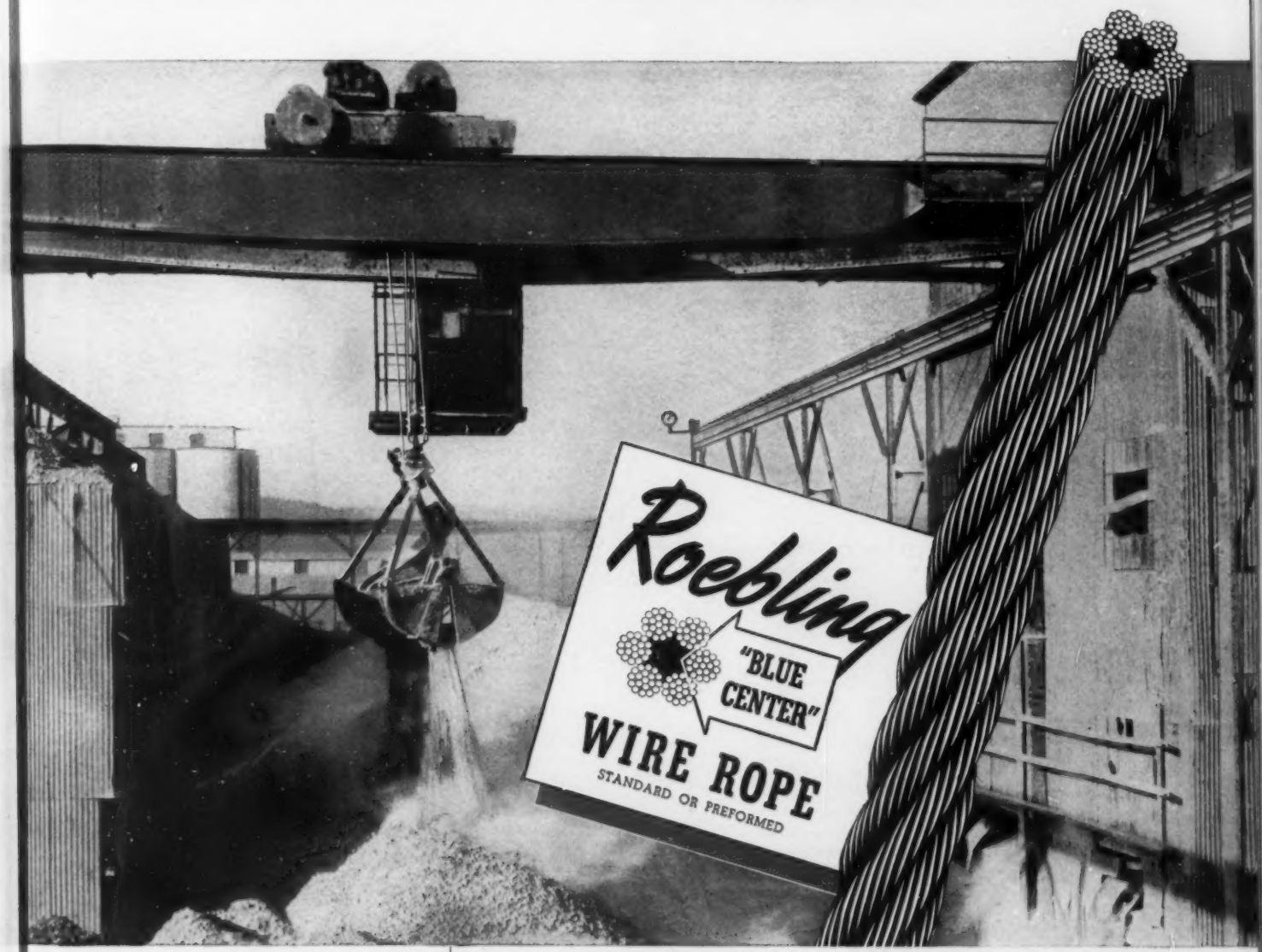
SHOVELS

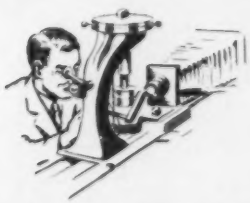
DRAGLINES - CRANES

Crawler & Wheel Mounted

THE GENERAL EXCAVATOR COMPANY, Marion, Ohio

Profit from Roebling Research!





YEARS OF RESEARCH DEVELOPED "BLUE CENTER"

Years of research have gone into the development of Roebling "Blue Center" Wire Rope.

Furthermore, the development and improvement of Roebling "Blue Center" is a never-ending process. A planned program of research is carried on ceaselessly in the Roebling Research Laboratory — one of America's most modern and completely equipped research units.

WHAT DOES Roebling Research mean to you? It means just this — that when you install Roebling "Blue Center" Wire Rope you can be certain that you will get in return the very last notch of service and safety which scientific rope development can assure.

When buying wire rope keep in mind that Roebling is not content to "follow the pack". Roebling's efforts to give you a rope that will assure the longest and safest service possible, means constant research—checks and investigations out in the field. It means constant laboratory research—in one of the country's most modern research units. Equally important—it means up-to-date thinking.

However, it's the service Roebling "Blue Center" Wire Rope is actually giving that's "proof of the pudding". Ask our local representative to give you the facts. Then install Roebling "Blue Center". Keep accurate service records. Compare. We are confident you will agree with others that Roebling "Blue Center" Wire Rope assures the utmost safety and lowest rope replacement cost.

JOHN A. ROEBLING'S SONS CO.
Trenton, N.J. Branches in Principal Cities

ROEBLING "BLUE CENTER" The Finest of all Roebling Wire Ropes

1.

WASTE OF INSTALLATION TIME

With the combination starter you have only one piece of equipment to install and wire.

2.

SACRIFICE OF VALUABLE SPACE

The combination starter takes less space than separate devices require. It can be mounted right on the machine.

3.

DANGER FROM "HOT" PARTS

You can't touch live parts on the combination starter. The switch must be OFF before the cover can be opened.

3 THINGS YOU'LL AVOID

Motor starter, manual circuit switch, and overload, short-circuit, and undervoltage protection — we've put them all together into one package. Now you can buy your control as a unit, install it as a unit, and benefit from a host of other important advantages!

And, if you wish, we can make the "package" dust-tight or watertight for increased dependability and longer life under severe dust and moisture conditions.

We'd like you to have our new publication GES-2456, "More for Your Control Dollar." It shows how other companies are money ahead because they use G-E combination starters for the motors they install and the machines they buy. Write for your copy. General Electric, Schenectady, N. Y.

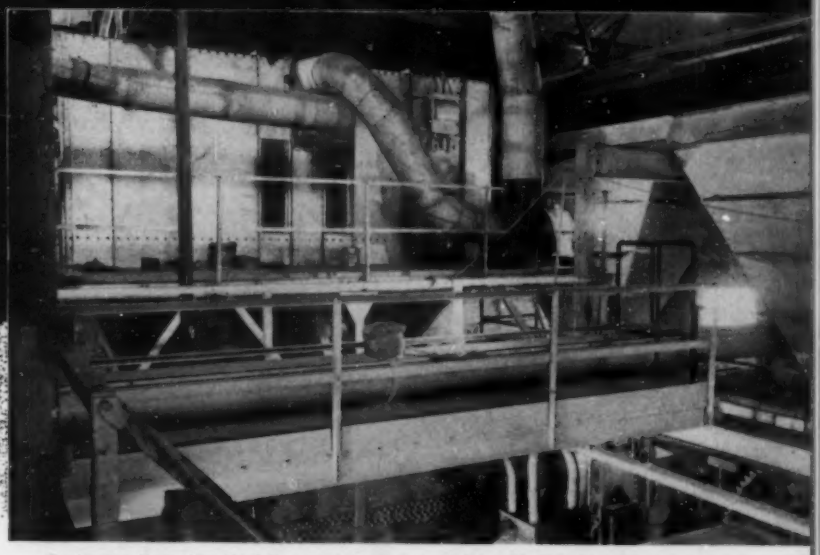
with G-E COMBINATION STARTERS

GENERAL ELECTRIC

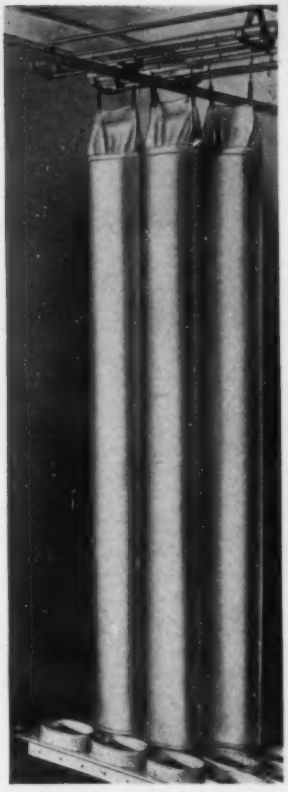
970-30

OUTSTANDING PERFORMANCE *in Dust Control*

CONTINUOUS *Efficiency*



Continuous Operating Oval Bag Dust Arrestor in finish mill. The filter relieves pressure built up in the air separators.

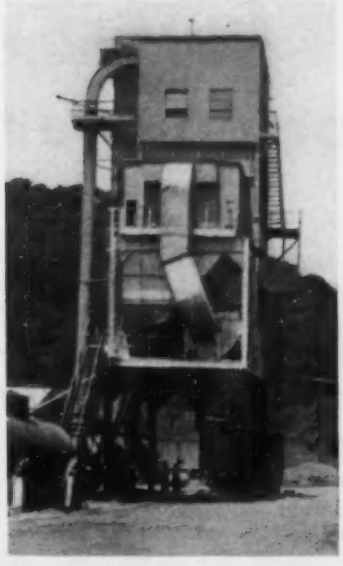


SUPERIORITY OF OVAL BAG DESIGN

The Parsons Oval Bag design combines all the advantages of the envelope and cylindrical types. Parsons Oval Bags WILL NOT PLUG—not even when handling dust from moist materials, insuring CONTINUOUS full filtering capacity. They will give you the lowest back pressure of any cloth arrestor and many years of uninterrupted service.

...*in the* CEMENT INDUSTRY

Parsons Oval Bag Dust Arrestors assure continuously efficient operation from raw grinding—to finish mill—to storage—to bagging machines. ALL FEATURES DESIGNED FOR MAXIMUM WEAR RESISTANCE. . . . No bag replacements for an average of more than ten years. . . . The case is sturdily constructed, and the working parts scientifically designed for long life. Write for Bulletin DA-6.



...*serving* QUARRIES *and* STONE CRUSHING PLANTS.

You can not only sell valuable fines when you use a Parsons Oval Bag Dust Arrestor but you will also profit by a cleaner plant, improved working conditions and longer lasting equipment. At the left is a Parsons Oval Bag Dust Arrestor collecting all dust from a stone crushing plant—*this dust is being sold as a filler.*

SELL YOUR DUST

Complete Line of Dust Arrestors

Continuous Automatic—Oval Type Bag—Unit Type—All-Metal Parclone Centrifugal.

PARSONS OVAL BAG *Dust* ARRESTORS

PARSONS ENGINEERING CORPORATION, CLEVELAND, O.

Columbia Quarry Company, St. Louis, Missouri, have just purchased a

5th

Superior DIESEL ENGINE

which will make their total installed capacity 2600 horsepower.

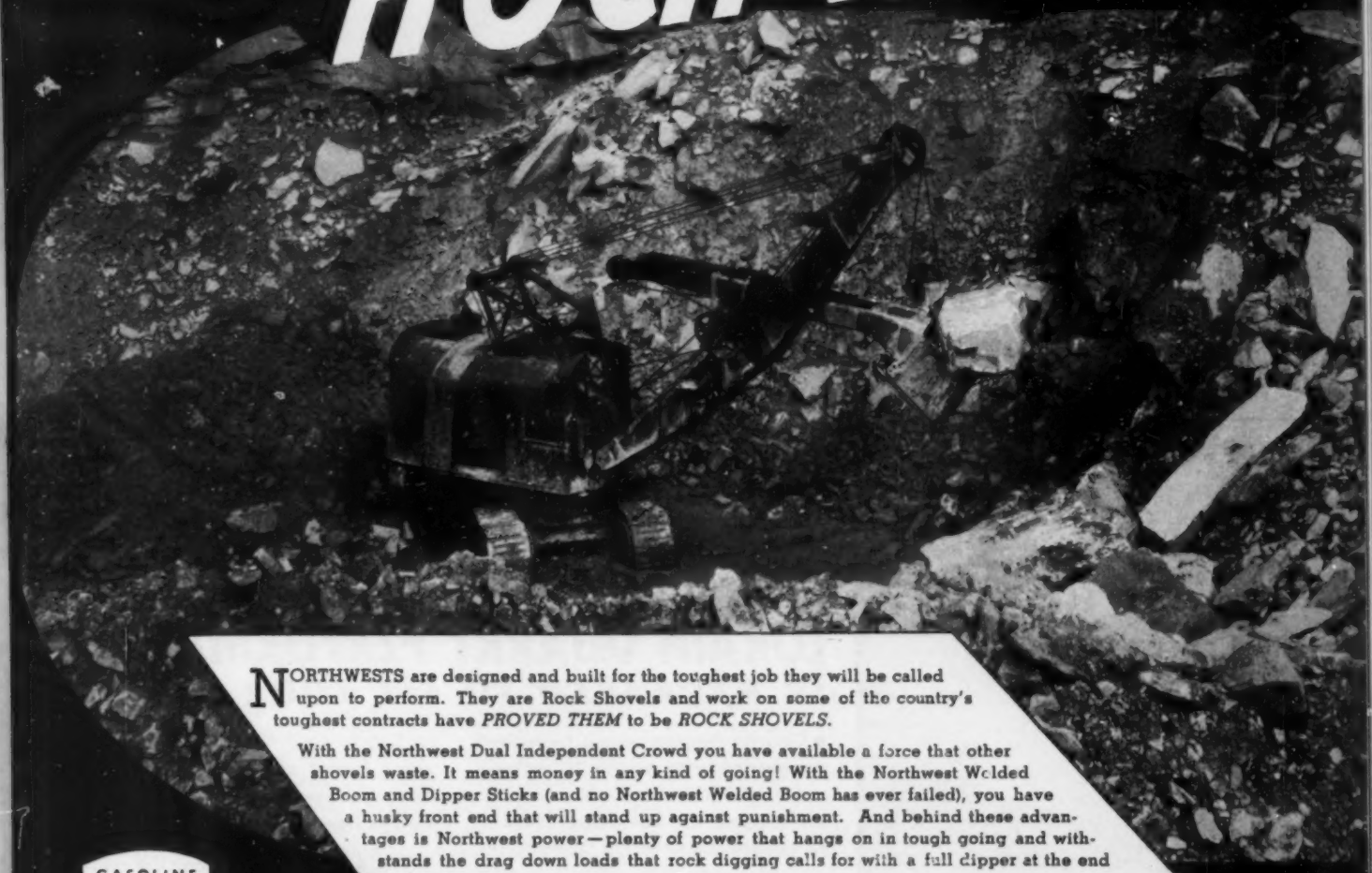
THE NATIONAL SUPPLY COMPANY

SUPERIOR ENGINE DIVISION

FACTORIES: Springfield, Ohio; Philadelphia, Pa.

SALES OFFICES: Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Cal.; Jacksonville, Fla.; Houston, Texas

BORN TO ROCK WORK



NORTHWESTS are designed and built for the toughest job they will be called upon to perform. They are Rock Shovels and work on some of the country's toughest contracts have *PROVED THEM* to be *ROCK SHOVELS.*

With the Northwest Dual Independent Crowd you have available a force that other shovels waste. It means money in any kind of going! With the Northwest Welded Boom and Dipper Sticks (and no Northwest Welded Boom has ever failed), you have a husky front end that will stand up against punishment. And behind these advantages is Northwest power—plenty of power that hangs on in tough going and withstands the drag down loads that rock digging calls for with a full dipper at the end of each cut.

Add to these features the "feather-touch" control, the Cushion Clutch and Northwest Uniform Pressure Swing Clutches and you have a combination that has proved hard to equal.

GASOLINE • ELECTRIC • DIESEL • OIL

Built in a range of 18 SIZES ⅜ yd. capacity and Larger

NORTHWEST ENGINEERING COMPANY
1820 Steger Bldg., 28 E. Jackson Blvd., Chicago, Ill.

NORTHWEST

SHOVELS . CRANES . DRAGLINES . PULLSHOVELS

-and when you have a real Rock Shovel you won't have to worry about output in dirt

¾-yd. Lorain-40A of the Manchester Sand-Gravel & Cement Co., Inc., Manchester, N. H.

½-yd. Lorain-30A of the Automatic Gravel Products Co., Muscatine, Iowa

¾-yd. Lorain-40 of the Great Notch Corp., Great Notch, N. J.

This 1¼-yd. Lorain is the 13th Lorain purchased by the Pennsylvania Glass Sand Corp., Lewistown, Pa.

LORAIN QUARRY PERFORMANCE
IS PACKAGED TO FIT YOUR NEEDS

● Greater digging power, increased capacities with which to handle more and heavier work, economical operation resulting from a simplified construction using fewer and stronger parts—that's Lorain performance and it comes in "packages" to fit your particular sand and gravel or quarry needs. The Lorain line has 19 models to choose from—shovels, draglines, clamshells ranging in capacity from ⅜ to 2 yd.—and you will get the same brand of performance from any one because all are built to Center Drive design.

Write today for catalogs describing ⅜ to 2-yd. Lorains. There's a plus value in each and every "package". It's the extra profit resulting from a Lorain's ability to *move more material, faster, at lower cost.*

THE THEW SHOVEL COMPANY • **LORAIN, OHIO**

THEW CENTER DRIVE REG. U.S. PAT. OFF.

LORAINS 19 MODELS ⅜ TO 2 YD.

THE KNOWN AND UNKNOWN FUTURE

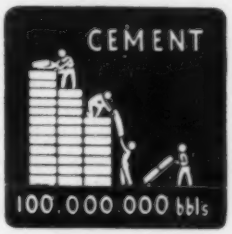
JUST WHAT does a United States Government 2 billion dollar defense *construction* program mean to the rock product industries? The 2 billion figure is the amount appropriated by Congress up to November 1; to be expended prior to July 1, 1942. The new Congress to assemble in January may add more; and we know from sad experience that government engineers invariably estimate below actual construction costs. Our figures are based on the breakdown made by the National Defense Advisory Commission itself, and the breakdown is in dollar values, so each reader can make his own estimate of volumes if ours doesn't suit him:

Cement, Brick and Hollow Tile, $175,000,000 (omit $25,000,000 for clay products, other brick and tile is concrete)	$150,000,000
Sand, gravel, crushed stone	80,000,000
Plaster, Wall Board and Insulating Board, $20,000,000 (omit $5,000,000 for pulp board)	15,000,000
Terrazzo (stone chips)	6,000,000
Unclassified 20 percent of Government figure of $125,000,000	25,000,000
	$276,000,000
Iron and Steel, $240,000,000—say at $24 per ton 10,000,000 tons of steel requires 6,000,000 tons of limestone or lime	6,000,000
Value of rock products to be used	$282,000,000

Now, remember these figures *do not* include an immense volume of defense construction privately financed—possibly as much more in the aggregate. Of course, all this volume of rock products will not be demanded in 1941. It may be strung out over two or more years; but until this emergency construction is completed we will not hit our full stride in the production and use of war materials. Only about half of this construction had been contracted for by December 1; and a very small fraction of it completed.

Judging by returns from a questionnaire to the industry about November 15 only a small fraction of the orders for these materials had been placed, and not enough preliminary inquiries had been made that producers had much of any idea what they would be called on to furnish in 1941.

Elsewhere in this issue the editors have endeavored to show where and what most of this construction work is like, to give a broad general picture, from which each producer in his own locality can figure out where he may fit into the picture.



Very Spotty Business

Portland cement manufacturers, in the aggregate covering the entire country, estimated shipments in 1940 for government defense construction from 1 to 10 percent of their total volume—an average of a little more than 4 percent. For 1941 manufacturers estimate from 1 to 40 percent will be used for national defense structures—an average of slightly less than 15 percent.

It is obvious that those companies with plants on and near the Eastern seaboard and the Eastern industrial districts, and the Pacific Coast plants, are getting the largest share of this business. We believe the figures given are very conservative and that much of the cement sold to dealers, ready-mixed, and concrete products producers, is being used for defense construction of one kind or another. Cement manufacturers should keep very close track of these, because the data would be invaluable if the issue of priorities in the use of power or railway facilities should arise. And with few exceptions cement manufacturers fear there will be car shortages in 1941.

Lime and limestone products manufacturers (including sintered dolomite and blast-furnace fluxing stone) are probably the most advantageously situated of any group in the rock products industry, with 50 to 100 percent of their products going into national defense essentials such as steel and chemicals. According to the American Iron and Steel Institute, with the steel industry operating 100 percent, it requires 25,000,000 tons of limestone annually for flux. With the present and future demands upon the steel industry we may be sure that any priorities in car service, power requirements or machinery requirements will favor limestone flux producers. Of course, this business is fairly well concentrated, as is the steel industry which is served.

Agricultural lime and limestone will undoubtedly continue to be used as at present, since there is no indication of a change in the agricultural program, or the soil conservation program. During the 1916-18 world war agricultural limestone was one of the first rock products to be recognized as essential; but our food problem then was one of shortages instead of surpluses, as today. However, much less agricultural limestone moves by rail now than then, so car shortages would not have the same blighting effect on the limestone quarry industry.

New York and New England

In New York and New England less than half the producers reported any business on account of national defense construction for 1940. The average of these producers was less than 8 percent of their total volume, ranging from 1 to 20 percent in individual cases. For 1941 these same producers anticipated getting an average of 23 percent of their business from national defense, varying in individual cases from 5 to 60 percent. However, not a single one who had no defense business in 1940 anticipated any in 1941, although several simply said they did not know what was in the cards. The figures given here include ready-mixed concrete, which is being used to a large extent for defense construction; and in most instances is supplied by producers who are primarily aggregate producers.

With few exceptions producers anticipated no trouble in obtaining necessary machinery and supplies; and only one foresaw possible railway car shortages. A few are ordering repair parts well in advance.

Middle East

Aggregate producers in New Jersey, Pennsylvania, Maryland, Delaware and eastern Ohio report from 1 to 10 percent of their shipments in 1940 for national defense construction — less than 25 percent of them having any such business; the average volume of those who did being less than 5 percent of their total volume. A few expect large increases from national defense construction in 1941; up to 50 percent of total volume in a few cases. Producers in this section, which is highly industrialized, in most cases are still dependent largely on defense highway construction, which up to this time has not been very clearly defined.

In only a very few instances do producers in this section express any concern about obtaining needed machinery and supplies. Only a few can see any signs of railway car shortages.

Southeast

The Southeast, as designated here, includes Virginia, North and South Carolina, eastern Tennessee, Georgia, Florida and Alabama. Here more than half the aggregate producers had some national defense business in 1940, ranging from 1 to 90 percent of their shipments—the average being about 25 percent. This is the highest average for any part of the country and is striking proof of the rapid industrial growth of the South. For 1941 in most instances producers expect increases in volume for national defense, although several say they have no idea what will be asked of them. Also some who had no defense business in 1940 expect some in 1941. Apparently a substantial proportion of the aggregate and ready-mixed concrete business in this section in 1941 will be required directly or indirectly for national defense structures.

A considerable number of producers in this section do expect difficulty in getting machinery and supplies, and still more anticipate railway car shortages. Indeed, in the "deep South," they have already experienced difficulty in getting open-top cars. One producer blames this on a tendency for the cars to gravitate to the Atlantic seaboard, and be held there. A few producers express concern about labor conditions—probably because the South as a whole has had less experience with union labor than the North.

Central West

The section we designate "Central West" in a sense is not West at all (ask any one from west of the Mississippi), but the states have much in common—Ohio, Indiana, Michigan, Illinois, Kentucky, Wisconsin. They are industrialized farming states; and as a group they are getting considerable national defense construction and it is fairly well distributed. The number of producers in these states who reported any defense business in 1940 is somewhat more than a third of those reporting. The average defense construction business of those having some was 20 percent of their whole volume, varying in individual cases from 1 to 40 percent. Those who expect defense business in 1941 are in almost every instance the same ones, and they predict about the same percentage, although some have no idea what is in store for them.

Practically none of the producers in this section have experienced any difficulty in getting equipment and supplies, but a few think there may be. Several foresee car shortages. One producer suggests that we keep ever before the National Advisory Defense Commission the essential nature of the products of this industry (aggregates) for construction work incident to the defense program, including factory buildings, housing and highways; also the desirablity of keeping men employed, who in this industry can be drawn from groups not specially fitted for employment in strictly war industries.

Middle West

The states included in this group are North and South Dakota, Minnesota, Iowa, Missouri, Kansas and Nebraska. Here we have a group of aggregate producers with practically no national defense business, and apparently no outlook for any. A very few producers expect some business on this account in 1941. Consequently there is no great interest in possible machinery or transportation shortages. Unless there is considerable highway building in these states, it looks now as if they had been left out in the cold. One Nebraska producer expects the state will lose 15,000 to 20,000 in population to the industrial East.

South Central and Southwest

The group of states included here comprises Arkansas, Oklahoma, Mississippi, Louisiana, Texas, Arizona and New Mexico. Of the aggregate producers in this section, only one-third have had orders for national defense construction materials in 1940 — the average of these being 26 percent of their total volume, ranging individual cases from 5 to 60 percent. Most of the business apears to be in Texas and Louisiana. The same producers expect considerably more of the business in 1941.

None of the producers in this section anticipate

trouble in getting machinery and supplies, but a majority expect car shortages—in fact they have already experienced car shortages in open-top equipment.

Pacific Coast

The figures for this section include some rip-rap stone, which is an important item in quarry products on the West Coast. About half the aggregate producers are furnishing materials for defense works, or allied structures, their average volume for this purpose being about 37 percent of their total volume. However, this figure is somewhat misleading in that three operators account for a large part of this with averages from 30 to 100 percent. All the producers having some of this business expect more of it in 1941, a few substantially more, so that perhaps something like 50 percent of the production of 50 percent of the producers will go into defense construction in 1941.

West Coast producers see no signs of machinery and equipment shortages, but they are about evenly divided on prospects of transportation shortages.

Financing Improvements

We found no instances where producers with defense construction business had any difficulty financing operations. They should not have because either R.F.C. or the Federal Reserve banks can arrange for loans on orders for federal defense work. A few producers who are anticipating business in 1941 said they were having difficulty in financing, but they should not have any if orders are actually in hand.

Incidentally, it is well to be properly financed if operators expect prompt deliveries of machinery and equipment, in case there should be shortages or priorities. We asked one machinery manufacturer how he would discriminate among prospective purchasers, if conditions made it necessary. He said: "That is very simple, we will pick the ones with the best credit ratings."

Prospects of Priorities

At this writing the whole subject of priorities is very much up in the air. Steel manufacturers insist that if business is properly handled and machinery manufacturers are not stampeded into ordering large inventories, there is no reason why requirements can not be taken care of in an orderly way. But some rock products operators already complain of slow deliveries, particularly of manganese-steel parts. There are said to be ample manganese reserves for 18 months' requirements in the United States at this time.

Interviews and correspondence with machinery manufacturers show that they are very reluctant to express any opinions as to what may happen; quite naturally, since we are all waiting to see what the national defense program is, and above all how it is going to be handled. It is apparent, however, that early shortages are likely to be in special alloy steels, like manganese-steel, in standard machine parts, like bearings, etc. However, there appears to be ample provision for these necessities for at least six months on the part of most manufacturers. Manufacturers generally believe price increases are inevitable, although they don't want to be compelled to make them; but scarcity of labor and materials can eventually have but that result.

A manufacturer of manganese steel parts wrote (in October): "We have already been faced with an increase in the price of ferro-manganese of 20 percent. The grade of ferro-manganese required in the manufacture of our manganese steel castings has increased from $100 to $120 per ton. We have also been forced to absorb an increase in the price of manganese steel scrap of 30 percent. Increased volume of activity has permitted us to absorb these costs without increasing our prices to the rock products industry. We shall continue our policy of no increase in price unless additional increased costs render this impossible. A practical suggestion to your readers would be the importance of segregating manganese steel scrap for resale to our industry, which will help maintain a better supply of manganese."

Labor Problems

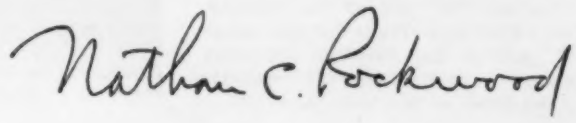
Much is made in government publicity of the alleged 10,000,000 still unemployed. However, it appears that there is no other basis for this figure than an estimate by the American Federation of Labor, which is interested in maintaining a 40-hour week. The truth is, probably, that if there are 10,000,000 unemployed, they are largely unemployables, because of old age, or lack of physique, or lack of intelligence. The prospects are that as usual in such times more and more men will be drawn away from their old jobs to temporary new ones paying more in current wages.

One factor that may affect this situation is the high initiation fees demanded by many of the A. F. of L. craft unions. These work both ways. They seem very unfair to the poor man looking for a job, but they may keep a man with a job from throwing it up to take another. The labor most tempted to make changes is undoubtedly the skilled employe of the machine shop. Those rock products producers who have well equipped machine shops might very well consider taking small contracts or sub-contracts for gun or munitions parts.

While we have neither read about or heard of any desire on the part of employers to deny labor its share of income from increased industrial activity, there is a feeling that labor should be satisfied with its increased earnings from extra time at time-and-a-half and double-time rates, rather than increased hourly rates. The government has taken the stand that industry *must* be satisfied with increased income from larger volumes at the same, or even reduced prices.

According to a recent issue of the *Wall Street Journal* (New York City):

> The government probably will refuse, in most instances, to reopen its defense contracts and adjust prices upward to compensate contracting companies for higher wages.
>
> This policy has not been definitely fixed by high ranking Administration officials, but it is the general tenor of opinion here. Adoption of the policy eventually appears probable.
>
> As one official put it, the Army and Navy did not intend, when they signed their contracts, to guarantee to the contracting companies the profit margin which they would have made on the basis of wages and other costs prevailing when the contract was closed. Changes in costs must, wherever possible, come first out of prospective profits regardless of the Government's legal power to reopen the original contracts, it was said.



NEWS ABOUT PEOPLE

OTTO F. SCHULZKE has been appointed superintendent in charge of production for the Missouri Portland Cement Co.'s St. Louis and Kansas City plants. Mr. Schulzke, a native of Springfield, Ill., has been associated with the Missouri company since 1910. At one time he was superintendent of the Prospect Hill, Mo., plant and in 1935 was named superintendent of the Sugar Creek, Mo., plant near Kansas City.

•

E. I. HENDRICKSON has been promoted to superintendent of the Colton plant of California Portland Cement Co.

•

ROBERT A. TEMPLE is now superintendent of the South Chicago plant of Marblehead Lime Co.

•

WILLIAM PORTER WITHEROW, president of Blaw-Knox Co., Pittsburgh, is the 1941 chairman of the National Association of Manufacturers' Committee on National Defense and Industrial Mobilization.

•

EDWARD A. PHOENIX, assistant sales promotion manager of Johns-Manville Corp., was honored December 3 at a luncheon in the Commodore Hotel of New York City in recognition of his twenty-fifth year with the company. Lewis H. Brown, president, presented Mr. Phoenix with a gold watch emblematic of membership in the Johns-Manville Quarter Century Club. Colleagues also gave him a gold watch chain, fob and scroll.

•

BURT H. BEVERSTOCK has been elected president and director of the Standard Portland Cement Co., Painesville, Ohio. He was formerly vice-president in charge of sales for the company and succeeds William Austin Davis, who resigned.

•

V. P. AHEARN has been elected chairman for 1941 of the National Manufacturing Trade Group, which is part of the National Industrial Council sponsored by the National Association of Manufacturers.

W. J. SWAGMAN has been named works manager of the Osborn, Ohio, plant of Wabash Cement Co., to succeed Lester E. Palmer.

•

C. H. SONNTAG has returned from Venezuela, where he was engaged for six months in studying the engineering and economic aspects of cement-making in certain parts of that country. He is now at his home in Rockland, Maine.

•

ON PAGE 60 of the December, 1940, issue of ROCK PRODUCTS in the story the Chicago Gravel Co., an unfortunate transposition of captions occurred under the photographs of two of the plant superintendents. The captions appearing under the accompanying photographs of S. C. Cutter, Jr., superintendent at Oswego plant and Herman Barts, superintendent at the Plainfield plant are shown correctly. Apologies are extended to both Mr. Cutter and Mr. Barts for this printer's error.

S. C. Cutter, Jr., superintendent of the Oswego plant of the Chicago Gravel Co.

Herman Barts, superintendent of the Plainfield plant of the Chicago Gravel Co.

•

M. M. COLLINS succeeds the late Paul Hensley as superintendent of Arkansas Portland Cement Co. plant at Okay, Ark. Mr. Hensley passed away on November 4 and had just previously been promoted to the position of superintendent to succeed J. F. Kaufman, who is now chief engineer of all the Ideal Cement Co.'s plants. Mr. Collins, the new superintendent of the Okay plant had been J. F. Kaufman's operating assistant for eleven years and prior to this time was at a plant in Mildred, Kansas.

•

H. D. RUHM, of the Ruhm Phosphate Co., Columbia, Tenn., has been elected first vice-president of the Middle Tennessee Technical Society for the ensuing year. H. R. Mosley of the TVA is president; Felix Williams of Monsanto Chemical Co., second vice-president, and R. J. Grissom of Charleston Mining Co., Inc., is secretary and treasurer.

•

R. E. ZIMMERMAN, vice-president of the U. S. Steel Corp., was elected president of the American Standards Association at its annual luncheon meeting in New York City.

•

THIS SEASON'S greeting cards, besides wishing us Merry Christmas, revealed that we have a poet in our midst. He is W. Jess Brown, vice-president of the Dixie Sand and Gravel Co., Chattanooga, Tenn., and this is the poem he sent as a greeting:

Democracies it seems are slipping
Since dictators set the pace,
Most kingdoms too, long since have joined
A pre-historic race.

Re-armament activities everywhere,
Our young men have to go,
While war news rasps upon our nerves
Thru press and radio.

Our dollar par rates fifty-nine,
A week's but forty hours,
And mounting taxes add unto
These growing woes of ours.

Still there are things these times can't change,
Nor years turn upside down,
So here's, "Best of Season's Greetings"
From your old friend,

—Buster Brown

•

Obituaries appear elsewhere in this issue

Use impact crusher, vibrating screen, classifier, and twin screw washer to make well-graded and clean stone sand to meet state highway specifications

Main plant to the right, wash plant center, and stone sand plant on the left

"Tailor Made" Stone Sand

By BROR NORDBERG

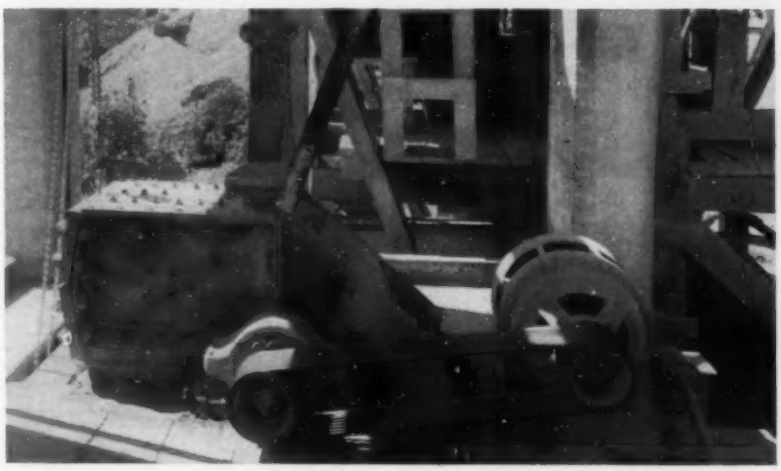
STONE SAND is being produced by commercial crushing plants in a number of ways. They generally use a wet process employing the principle of hydraulic classification with the bowl, screw washer or sand drag types of equipment to control the gradation. A few companies use a dry process either by simple dry screening or make it with air classifiers and cyclones as an incidental product to the manufacture of other fine materials, such as agricultural limestone.

Very few of these stone sands are a manufactured product, strictly speaking, since they are made from screenings originating elsewhere in the plant and their production is purely a job of classification and control. Shapes of individual particles in these sands vary according to their origin, whether the screenings be the result of blasting in the quarry and handling or a byproduct of crushers having various designs which influence physical characteristics of their output.

Stone sand, in the opinion of many engineers, should be free from elongations and slivers and have particle shapes that are uniformly "cubicle" for the best results when used in concrete. Selection of a particular method of crushing screenings or larger stone to produce a sand has, in some cases, a lot to do with shapes of particles in manufactured sands. Whether adoption of such a process in the interest of producing sand to get a certain shape and the cost of doing it is justified depends upon the available market, the attitude of the purchasers of sand, the closeness to other sources of sand supply and comparative freight rates, tonnage capacity and other factors. In many market areas it just wouldn't be practical.

Probably the first company to manufacture a stone sand by use of an impact crusher is the Virginian Limestone Corp., Ripplemead, Va., which marketed some 15,000 tons of stone sand in 1939. A stone sand plant was installed a year ago to manufacture 12,000 tons of stone sand for use in a large construction project in a part of the State of Virginia remote from sources of natural sand.

Location of the plant is in rugged, mountainous country where the stone is very hard and durable. The stone is a dolomite (30 percent $MgCO_3$) that has a specific gravity of 2.82 and a Los Angeles rattler test loss of 22 to 26 percent. Quarrying is done on a 180-ft. vertical face, and a Woodford electric haulage system delivers the stone to the plant. Probably 50 percent of the daily production of 3000 tons in 10 hours is commercial stone, the remainder ballast, which is shipped over the Virginian railroad.

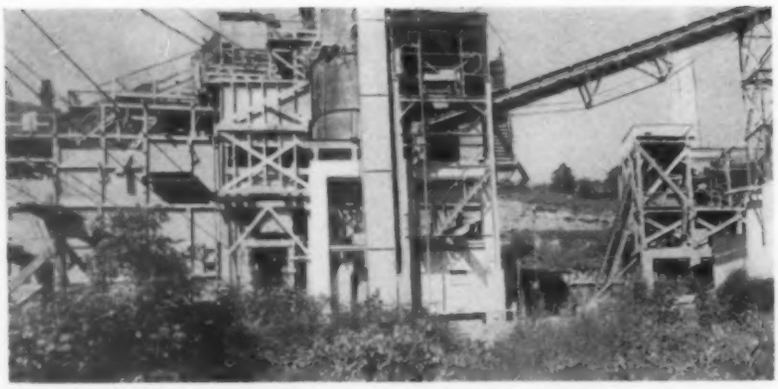


Close-up of impact crusher used in making stone sand

Crushing, Screening and Hydraulic Classification

After passage through the primary crusher in the main plant, stone is put over a grizzley with 4¼-in. square openings and ahead of two secondary crushers to by-pass the smaller material, which contains any clay and other foreign material from the quarry, to a washing plant. The rest of the stone is crushed, put through reduction crushers and sized over screens without washing.

Any of the dry stone products com-



Broadside view of stone sand plant, showing stocking and loading belt on the right

ing off these screens can be conveyed directly by belt conveyor into a 50-ton bin at the stone sand plant. Another source of feed into this bin, by belt conveyor, is the surplus sizes in yard storage. The sand plant, which incidentally can also produce chips and agricultural stone, was built partly for that purpose—to make saleable material from surpluses.

Essential equipment in the sand plant includes a 50 ton steel bin which feeds into a 30-in. Symons impact crusher, a 4- x 12-ft. Symons double-deck horizontal vibrating screen, a 72-in. Wood-Auto-Vortex classifier and a twin 14-in. diameter screw washer. Normally, feed into the crusher is about a No. 4 to 1½-in. dry stone but up to 2-in. sizes have been used. Feed from the circular, taper-bottomed bin is regulated and adjusted by. a manually-operated gate at the junction of the bin to a 5 ft. 4-in. vertical spout feeding the crusher. Turning speed of the crusher is 1200 r.p.m. and its drive is a 60-hp. motor through v-belt.

Coming from the crusher, the stone is elevated to the screen which has ⅜-in. and No. 8 spring steel wire cloth on the top and bottom decks, respectively. Stone passing the top deck and retained on the lower screen is ordinarily taken off as a chip size product to augment production of that size in the main plant as there is considerable demand for it in this part of the country. Oversize stone is carried back into the feed bin by a short belt conveyor to re-circulate through the crusher, and on occasion the chip product also is re-circulated.

Minus 8-mesh is the stone that is classified to meet West Virginia and Virginia State Highway specifications and any others which govern. Production of fines is sufficient so that by classifier adjustments any specification can easily be made.

The process is a combination wet and dry method, with water applied to treat the minus No. 8 mesh material after it passes the screen. The process is generally dry as far as crushing and screening are concerned since the efficiency is much better when dry material is fed to the crusher. Much of the time the Wood classifier, located just below the screen, is by-passed and the material through the lower screen deck enters the screw washer. Feed into the washer contains about 20 percent minus 100-mesh, half of which is overflowed from the washer and wasted in nearby New River.

In most of the tonnage produced to date, particularly on the large contract mentioned, fines up to 10 or even 15 percent under 100-mesh have not only been acceptable but were considered preferable.

In producing stone sand to Virginia and West Virginia highway specifications, the fraction below 100-mesh must be reduced to about 5 percent. West Virgina specifies that 100 percent pass a ⅜-in. screen, 95-100 percent pass No. 4, 75-95 percent No. 10, 35-75 percent No. 20, 5-25 percent No. 50 and 0-5 percent go through 100-mesh. Virginia, which blends stone sand half and half with natural sand, requires 50-75 percent through No. 20, 10-25 percent through No. 50 and 0-6 percent passing 100-mesh. Otherwise the two are essentially identical.

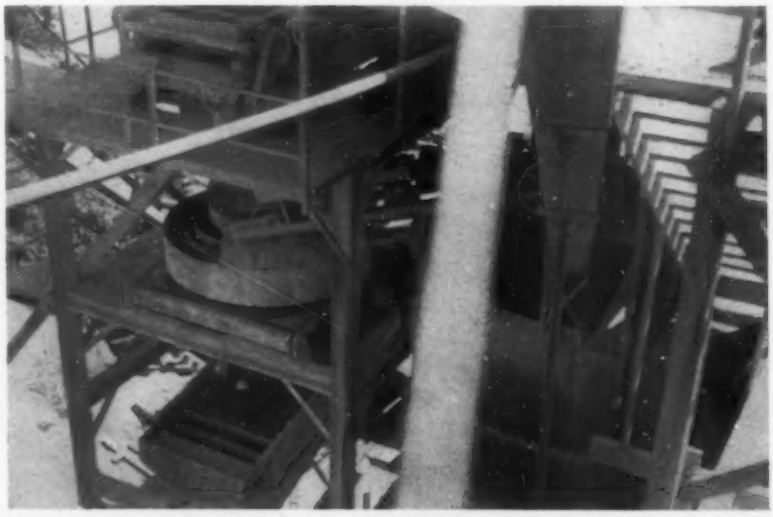
Recovering Fines

These sands are produced by first putting the fines from the screen through the Wood classifier, which overflows the extra fines to waste and drops its settled product into the screw washer. Adjustments in the volume of water and the spacings of the weirs in this classifier and the regulation of the water level in the screw washer provide the flexibility to easily meet the various specifications for gradation. Finished product is manufactured at the rate of 14 tons per hour; with the washer discharging the sand with about 17 percent moisture directly on to an inclined belt conveyor. There is no bin storage, the sand discharging into stockpiles or spouting direct from the end of the stocking belt into cars. This method produces a sand very closely approximating in shape natural sands that are considered ideal for concrete.

Feed into the crusher is about 30 tons per hour, which provides a circulating load of about 50 percent. Overloads are noticeable by the sound in the crusher motor, indicating too much circulating load, and the slide gate at the bin is reset accordingly.

According to the operator's experience, it makes no difference on the shape of particles whether the feed stone is crushed only by a single pas-

(Continued on page 38)



Illustrating sequence of stone sand processing. On top is vibrating screen; below is classifier to get rid of excess fines, and following this unit, below, is the screw washer. Short conveyor returns circulating load into bin.

Automatic Sand Settlers

Article 18 describes various devices which are modifications and improvements of the simple tilting box

By EDMUND SHAW

With the growth of the sand and gravel industry, and especially with the demand for washed and graded materials, there came a new interest in sand washing some 25 years ago, and a number of machines and devices were placed on the market. Some of them lasted only a short time, and others have become standardized. The main part of the description which follows will be confined to the sand washers now in common use.

In a broad way all of the present sand washers may be divided into two classes, as described in Article 6, October, 1939: those which settle the sand and allow it to run out of a controlled orifice by gravity, and those which settle the sand and then excavate it by some mechanism. The first class is the cheaper to build and its machines enjoyed a wider popularity at one time than they do now. But they are still standard machines, and where the rather high water content of the product is no disadvantage and the headroom is available, they will do the work.

Examples of this first class are: the tilting tank, Dull cone, Allen cone and many others. All of them have a conical or pyramidal receptacle (or something approaching a cone or a pyramid) to receive the sand. When a certain amount of sand has been settled in the receptacle, a valve at the apex opens automatically, allowing the sand to run out. The opening of the valve may be controlled by the weight of the sand, as it is in the greater number of these devices, or the depth of the sand as in some highly specialized types where classification as much as dewatering is the object of the machine. But all of this class will do some classifying as well as dewatering.

Before describing the machines in detail it will be necessary to explain the principles on which they work. The main principle, that of catching the sand in a receptacle, has already been explained; that is, such settling tanks belong either to surface current or rising current devices, according to the way they are fed. But the removal of the sand by allowing it to flow through an orifice demands further explanation.

Flowing Quicksand

Sand which is so thoroughly saturated with water that all the voids are filled is called *quicksand*. Dry sand and moist sand in a pile behave as soft solids, but a quicksand has the properties of a liquid. A tank full of quicksand cannot support much weight and many persons have been drowned in the quicksands formed by rivers. It will flow like a thick and sluggish homogeneous liquid, and it can be pumped and run through pipes, provided there are no close bends and sharp corners to be passed. It will run out of a hole at a rate that varies mainly with the friction on the sides of the hole and between the grains.

The moisture required to make a flowing quicksand is that which is necessary to fill the voids plus an amount needed to allow the grains a little space to move. The writer made a great many determinations of the water content of discharges from tilting boxes and like devices and found that they are usually in the neighborhood of 28 percent water by weight. With fine sands the moisture content is around 30 percent, and with coarser sands may be as low as 25 percent. The moisture content varies with the voids and also with the surface area to be wetted.

This moisture figure, it must be borne in mind, is the percentage of the whole. Thus a 30 percent moisture content means that the water is 30 percent of the whole, 70 percent of the sand plus water being sand and 30 percent water. If the weight of the sand alone is taken as a base, the water weight is about 43 percent. A 30 percent discharge will carry 0.43 lb. water for every pound of sand. A 25 percent moisture discharge (which may be obtained with concrete sand) will carry 0.33 lb. water for each pound of sand.

When the sand discharged from any of the box or cone devices has settled it will be found to contain less moisture. Samples of such a discharge will always show free water on top. Where the sand can be drained, as it usually can be in a bin, this is of no moment, but where there is no chance to drain it, as when it has to be handled on a conveyor belt, there will be an excess of water to be disposed of in some way, and generally this is inconvenient. It is better in such a case to choose one of the other types of sand settler that give a dryer product.

The oldest automatic sand settler is the tilting box, and its name describes it fairly well. It was a box with two compartments, one of which received

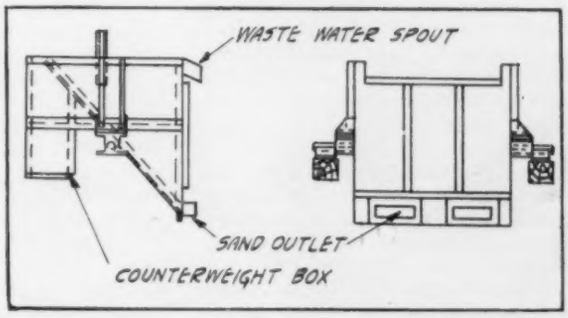


Fig. 1, right: Sand tank closely resembling the original tilting box

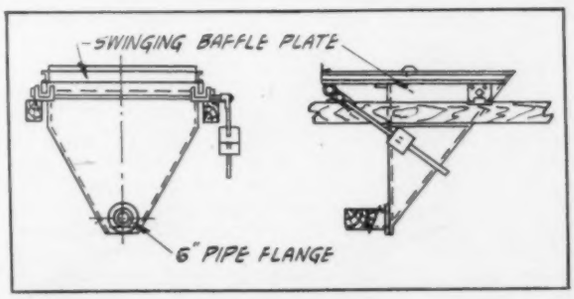


Fig. 2, left: Tilting tank adjusted by having weight on lever arm

the sand, while the other held a counterweight. When enough sand had settled to overbalance the counterweight the box tilted and the sand ran out through a hole that was uncovered by the tilting action. This tilting box was patented long ago in the United States, in 1852, if the writer's memory is correct.

Although no longer made in its original form, commercial machines working in the same way are regularly made and sold. The "balanced type" of steel settling box made by the Stephens-Adamson Manufacturing Co. is an example rather close to the original type. Fig. 1 shows it in side and front elevation. It is substantially made of steel plate and angles with the counterweight box attached to the sand receptacle. The one adjustment is that of the weights that go into the counterweight box. The sliding angle of the bottom is about 49 deg., which is about as low as it is safe to make it for all sizes of sand. This machine is made in two sizes, No. 10 and No. 20. The main dimensions are:

	Length	Width	Overall Height
No. 10	66 in.	66 in.	69 in.
No. 20	89 in.	81 in.	94 in.

The recommendation of the makers is to use No. 10 with a single row of the smaller screens and No. 20 with one row of the larger screens, or two or three rows of the smaller screens. The capacity for such a settler may be figured by the method given in earlier parts of this series for any desired split.

This is a thoroughly reliable tank. The writer watched the operation of two of the larger size in the plant of the Dixie Sand and Gravel Co., Chattanooga, Tenn., for some time and was well satisfied with their steadiness and sensitiveness. The men in charge said that they had given no trouble from flooding.

The Stephens - Adamson company also makes an automatic sand settler in which the weight of the sand is balanced by a counterweight on a lever arm. It is adjusted by moving the counterweight (Fig. 2).

The Webster Manufacturing Co. makes a settling tank of much the same type as that just described, that is, having a sand receptacle with a permanently attached counterweight. It has, however, an improved form of valve which should close more tightly when the settler is not discharging than the usual flat piece of belting can close a valve. In the Webster tank the valve is a flat cone on a spindle. The cone gives a wedging fit in the pipe and the snugness of the fit of the valve in the pipe may be regulated by a nut and lock nut. In this way wear may be compensated and a close adjustment of the valve opening may be made without varying the weights in the counterweight box (Fig. 3).

In the next installment the discussion of automatic settling tanks will be continued. Other modifications of the tilting tank and the cone type settler will be described.

Road Builders Program

A TENTATIVE PROGRAM has been announced for the annual meeting of the American Road Builders Association at the Hotel Pennsylvania, New York, N. Y., starting January 27. The theme of the meeting will be "Roads for Defense." Speakers of national prominence will address the meetings, including William H. Knudsen, member of the National Defense Advisory Committee; Charles M. Noble, special highway engineer, Pennsylvania Turnpike Commission, who will have as his subject, "Engineering Design for Superhighways"; Col. Robert Olds, U. S. Army Air Corps, on "Military Use of Civil Airports"; A. W. Brandt, chief engineer, division of highways, New York Department of Public Roads, on "East Coast Defense Highway"; and H. G. Sours, on "Highways in National Defense."

Manufacturers also will take part in the program, including Lion Gardiner, vice-president, Jaeger Machine Co.; Frank Newkirk, civil engineer of the Caterpillar Tractor Co.; and John W. Poulter, research engineer of Koehring Co.

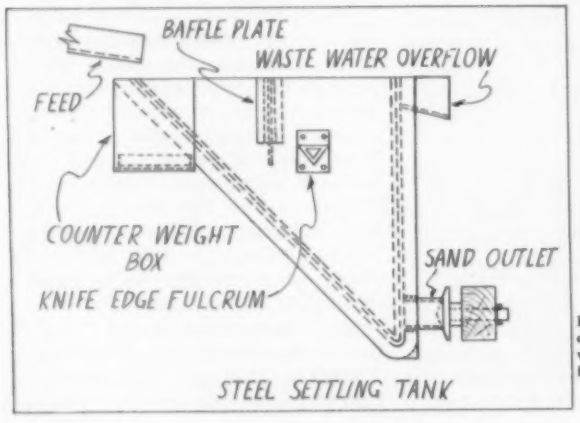


Fig. 3: Tank with special sand outlet in which the outlet pipe is closed upon a flat cone

Accidents In Phosphate Fields of Florida

FLORIDA'S pebble phosphate industry has been active in accident prevention for a number of years. In a recent report of the Bureau of Mines, the accident experience for the period from 1930 to 1938 showed that the accident frequency rate for the industry is 23.38 and the severity rate is 1.779. The industry employs 1500 to 2000 men. The phosphate conglomerate or matrix is overlain by 10 to 50 ft. of sand, sandy clay, or a porous, friable sandstone, most of which is removed by electric dragline excavators. The matrix is mined hydraulicly and pumped into the washing and flotation plants; the concentrates are hauled by steam or electric locomotives to central plants where they are classified, dried, and stored ready for shipment. Feet injuries are most frequent, with injuries to fingers running a close second. Handling material causes 20.2 percent of the accidents, falling persons is second with 18.9 percent, and machinery third with 12.1 percent.

"Tailor Made" Stone Sand

(Continued from page 36)

sage through the crusher or whether it has been subjected to several impacts as part of a circulating load. The general size is decidedly "cubical." Crushing efficiency has been proved better as the feed is increased up to about 2-in. size, after which overloading is likely when producing this material. Capacity seems to stay at 14 tons per hour whether rejects from the screen are added to the return feed or not. The breaker plates are of chrom-molybdenum alloy steel 2 in. thick.

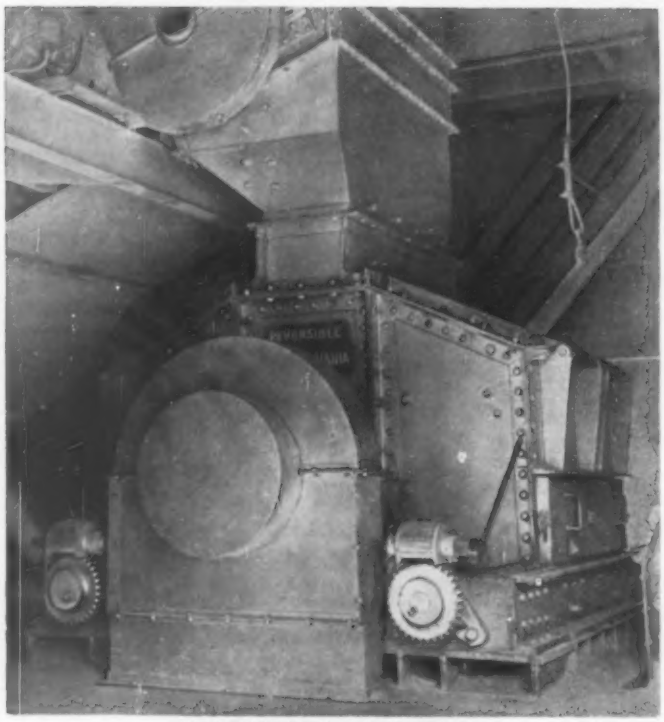
Agricultural stone can easily be produced in the sand plant by merely by-passing both the classifier and the washer, thereby retaining all the fines. An indirect benefit of the installation is that the sized material between screen decks is certain to come well within the test requirements for soundness, should there be contamination in the stone, since soft material will break down through the crusher into fines which are screened out. D. E. Hamlett is in charge of operations of the Virginian Limestone Corp.

300 MILLION DOLLARS For Rock Products

Defense Program Means Big Increase in Business

Official Photographs U.S. NAVY

"PENNSYLVANIA"



"PENNSYLVANIA"
REVERSIBLE
HAMMERMILLS

"Pennsylvania" REVERSIBLE Hammermills, with High Drop, Central Feed, do major crushing by smashing head-on impact, between the Hammer *faces* and imperforate Anvils,—and finish the sizing over Duplex adjustable cages,—in Monday, RIGHT HAND,—Tuesday, LEFT HAND operation.

This advanced technique affords,—

AUTOMATIC HAMMER TURNING

•

AUTOMATIC HAMMER AND CAGE BAR RESHARPENING

•

INCREASED CAPACITY OR FINENESS

•

IMPROVED TRAMP IRON SEPARATION

•

SYMMETRICAL INTERNAL WEAR, WHICH MINIMIZES DISCARD

•

REDUCED POWER DEMAND

•

SHARPLY CUT UPKEEP COST

Complete Raw Side Crushing Equipment

Put Your Reduction Problems up to "Pennsylvania" Engineers

Representatives in Principal Centers

PENNSYLVANIA CRUSHER COMPANY

Associated with Fraser & Chalmers Eng. Wks., London

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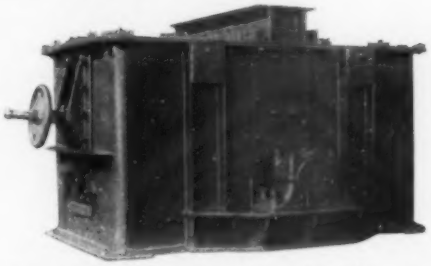
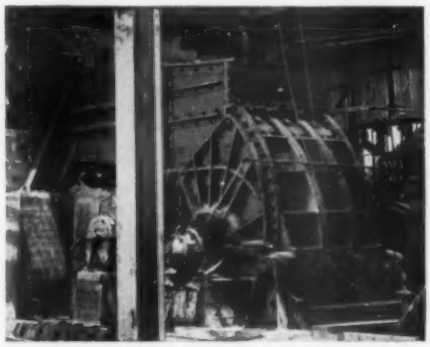
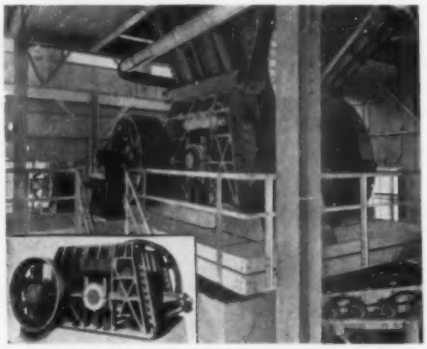


"PENNSYLVANIA" REVERSIBLE IMPACTOR,—the advanced type which crushes abrasive materials by *impact*,—without *attrition*,—specialized for preparing Aggregates, Road Chips, Artificial Sand and Refractories, to "premium" particle form, with minimum fines,—and for low cost "granulating" of Ores, Sinters, etc. Patented. Bulletin 6000.



PENN-PRIMARY Hammermills with Dump Hopper and Feeder combine the primary and secondary reductions of Cement-making materials, at minimum building, foundation, rehandling, power and maintenance costs. Patented. Bulletin 1020.



PENN-LEHIGH and PENNSTEEL Series Single Roll Crushers (12 sizes) are specialized equipment for the Primary and Secondary reductions of Cement-making Materials, Limestone, Gypsum Rock and Ores, —DRY, *DAMP* or WET. Patented. Bulletins 2003 and 2004.

STEELBUILT CRUSHERS

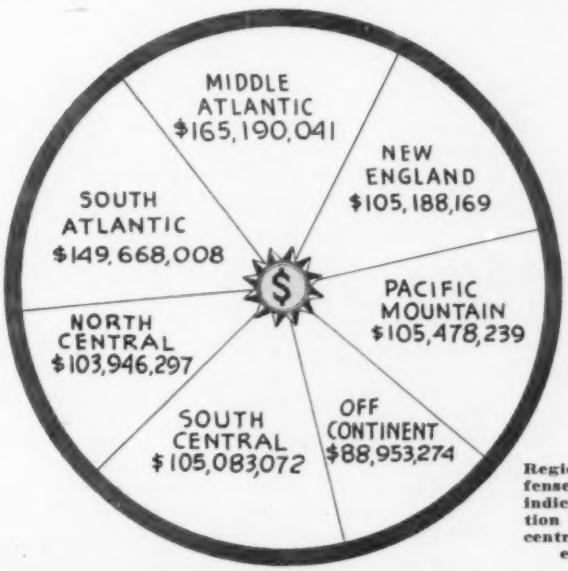
Batching plant of the Pennsylvania Supply Co., Harrisburg, Penn., to supply ready-mixed concrete to Indiantown Gap military reservation. Aggregates are hauled by truck in 15-ton loads from company's plant at Highspire, Penn.

Your Share of Defense Business

Articles which follow point out how defense orders are secured, the Government requirements, and how producers meet specifications

With the last big appropriation voted by Congress prior to the national election, over 13 billion dollars had been provided for the largest defense program in the nation's history. While the last World War expenditures were larger, there has never been a period when this country was not engaged in war that such vast sums were made available for defense.

Although the total appropriations for construction in this program amount to two billion dollars, the expenditure of 11 billions for armament, clothing, ships, etc., will have a very important indirect influence on the trend of business in the rock products industries. More factories, housing, and other construction, privately financed, will be required to sustain the war industries. In fact, it has been conservatively estimated that these privately financed projects will at least equal the government financed projects. *Engineering News-Record* reports that for the first nine months of 1940 $350,000,000 in contracts were awarded as against $170,000,000 for a similar period in 1939, and this does not include direct government subsidies of $150,000,000 for munitions plants in 1940.



Regional allocation of defense construction awards indicates a wide distribution with the largest concentration along the eastern seaboard states

Producers of cement, lime, gypsum, sand and gravel, crushed stone, slag and other essential mineral products are just beginning to feel the impact of defense construction, and are taking a very complacent attitude toward the whole program. Not all producers, of course, will be strategically located to get a large slice of defense business, but a glance at the tabulation of construction contract awards shows that every regional group of states will have a substantial percentage of the total business.

Of the total construction awards

DEFENSE CONSTRUCTION AWARDS

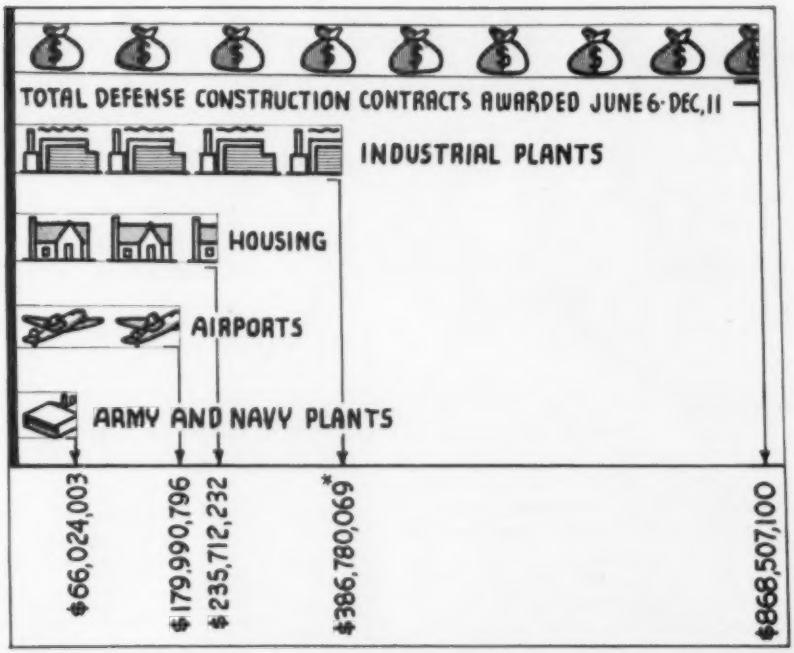
For Period June 6 to Dec. 11	Housing Army-Navy	Housing Civilian	Airports	Plant Facilities Army-Navy	Plant Facilities Industrial	Remarks
New England Region—						
Quonset Point, R. I.			$ 23,154,000			
Newport, R. I.	$ 1,655,000	$ 1,105,000*		$ 562,500		*U. S. H. A.
New London, Conn.	277,000			3,448,000		
Portsmouth, N. H.		1,600,000*		1,085,000		*U. S. H. A.
Springfield, Mass.				695,000		
Boston, Mass.	2,586,345			1,225,000	$ 665,000	
Groton, Conn.					2,750,000	
Boston, Ft. Devens, Mass.	8,255,824			544,500		
Providence, R. I.	1,655,000					
Hartford, Conn.		4,307,000*				*U. S. H. A.
Falmouth, Mass.					35,400,000	
Bridgeport, Conn.					24,218,000	
Total	$ 14,429,169	$ 7,012,000	$ 23,154,000	$ 7,560,000	$ 63,033,000	
Middle Atlantic Region—						
Philadelphia, Pa.-Norfolk, Va				$16,175,000*		*Docks
Brooklyn, N. Y.				3,845,000		
New York-Iona Island				703,000		
New York Navy Yard				1,687,000		
Philadelphia, Pa.-Parris Island, S. C.				1,260,000*		*Power plant
Brooklyn, N. Y.				2,820,000		
Annapolis, Md.					$ 1,210,000	
Edgwood Arsenal, Md.				5,898,000		
Pittsburgh, Pa.					2,275,000	
Baltimore, Md.				3,226,500*		*Piers
Philadelphia, Pa.	$ 1,017,000			7,834,270	45,314,384	
New York, N. Y.	3,419,661				11,325,000	
Ft. George Meade, Md.	7,353,507					
Indiantown Gap, Pa.	5,413,735					
Staten Island, N. Y.					2,706,000	
Titusville, Pa.					907,720	
Wheatfield Township, Niagara C. N. Y.					1,023,200	
Pine Camp, N. Y.	5,823,675					
Washington, D. C.	3,845,400					
York, Pa.	361,115*					*Includes roads
Sandy Hook, N. J.	67,407*					*Water—sewers
Netuchen, N. J.	244,816					
Red Bank, N. J.	3,197,154					
Ft. Saulsbury, Del.	57,570					
Ft. Story, Va.	397,351					
Bethlehem, Pa.					22,317,200	
Ft. Tilden, N. Y.	438,505					
Ft. Hancock, N. J.	488,360					
Lakehurst, N. J.			$ 128,700			
Camp Upton, N. Y.	638,661					
Carlisle Bks, Pa.	319,650					
Steelton, Pa.					1,290,500	
Cape May, N. J.			150,000			
Total	$ 33,093,567		$ 278,700	$43,448,770	$ 88,369,004	
North Central Region—						
Wilmington, Ill.					$ 20,700,000	
Manitowoc, Wis.					1,000,000	
Chicago, Ill.-Great Lakes, Ill.	$ 1,774,000				4,987,451	
Wichita, Kans.						
Cincinnati, Ohio					500,000	
Sioux City, Iowa	8,428,670				11,500,000	
Grand Rapids, Mich., Ft. Custer	2,078,815					
Ft. Benj. Harrison	245,500					
Dayton, Ohio			$ 2,619,700			
Chanute Field, Ill.			1,010,680			
Ft. Sheridan, Ill.	1,071,534					

(Continued on page 44)

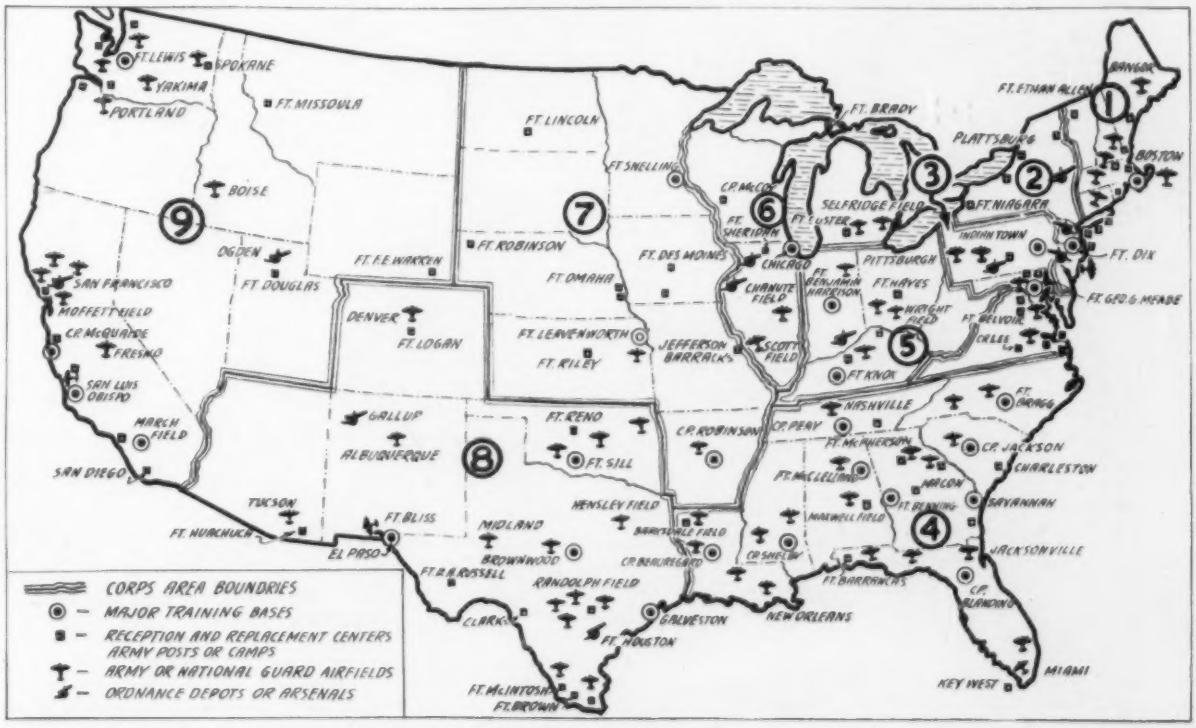
made through the National Defense Commission from June 6 to December 11, totalling $868,507,100, 10 percent went to Off Continent locations, such as Alaska, Panama, Hawaii, and the Pacific islands; 12 percent to the North Central region; 13 percent to the Pacific-Mountain section; 13 percent to New England; 19 percent to Middle Atlantic; 16 percent to South Atlantic; and 17 percent to South Central states. This figure represents contract awards and not total defense appropriations which may change the allocation of funds.

The tabulation, which shows only government awards and no private financing in the interests of defense, has been arbitrarily broken down into awards for housing, military and civilian; airports; and plant construction, military service and industrial. Industrial plant construction represents government buildings for manufacture of munitions to be operated by private industry. Under the classification of airports, some portion of the funds will be used for housing, but the separated allocation of funds could not be easily determined. The civilian housing represents largely USHA funds for projects in new communities to be built for munitions workers where adequate local financing could not be obtained.

The largest construction expenditures are for plant facilities, $386,780,069 for privately operated industrial plants and $66,024,003 to be operated directly by the military and naval services. Next in importance is housing with $204,993,932 for barracks, hospitals, etc., and $30,718,300 of USHA funds. Airports including some housing, accounts for $179,990,796. The charts show the allocation of these funds by regions and type construction for the country. The above figures do not include dredging, excavating and other contracts that do not call for the use of construction materials, unless this work was part of a general construction contract.



Graph showing total defense construction awards and relative appropriations for housing, airports, and industrial structures



Showing location of principal army and navy training fields, airports, ordnance depots, and arsenals where construction program is under way

DEFENSE CONSTRUCTION AWARDS (Continued)

	Housing			Plant Facilities		
	Army-Navy	Civilian	Airports	Army-Navy	Industrial	Remarks
North Central Region (Continued)—						
Ft. Snelling, Minn.	126,713					
St. Louis, Mo.	303,532					
Burlington, Iowa					9,499,032	
Scott Field, Ill.			337,497*			*Mess halls, school
Camp Grant, Ill.	3,638,773					
Proving Ground, Ill.	283,400					
Union Center, Ind.					11,500,000	
Selfridge Field, Mich.			666,000			
Rock Island, Ill.		$ 1,250,000*				*U. S. H. A.
East Moline, Ill.		415,000*				*U. S. H. A.
Detroit, Mich.					20,000,000*	*Tank plant
Total	$ 17,950,937	$ 1,675,000	$ 4,633,877		$ 79,686,483	
South Atlantic Region—						
Quantico, Va.			$ 1,394,250			
Miami, Fla.	$ 555,000		3,342,500			
Pensacola, Fla.			3,835,000			
Jacksonville, Fla.	1,575,605		13,028,000		$ 772,160	
Norfolk, Va.		$ 1,800,000*	13,125,000	$ 687,500		*U. S. H. A.
Parris Island, S. C.			2,394,000			
Fort Bragg, N. C.	3,731,845					
Radford, Va.					25,000,000	
Savannah, Ga.			1,550,113			
Fort Jackson, S. C.	3,443,632					
Chickasaw, Okla.					2,500,000	
Yorktown, Va.	4,026,260					
Wilmington, Dela.					37,060,000	
Greensboro, N. C.					3,069,000	
Richmond, Va.	713,000			1,779,000		
Charlotte, N. C.	525,000					
Ft. Belvoir, Va.	5,784,000					
Columbus, Ga., Ft. Benning	1,483,566	2,024,000*				*U. S. H. A.
Ft. Story, Va.				93,528		
Eglin Field, Fla.			351,848			
West Palm Beach, Fla.	1,528,910					
Macon, Ga.	5,434,880					
Camp Lee, Va.	7,539,051					
Portsmouth, Va.		2,160,000*				*U. S. H. A.
Newport News, Va.		1,806,000*				*U. S. H. A.
Charleston, S. C.		1,416,000*				*U. S. H. A.
Arundel Corp. & Consolidated*	1,439,360					*Location not given
Brown and Root, etc.*			2,700,000			*Location not given
Total	$ 37,780,109	$ 9,206,000	$ 31,720,711	$ 2,560,028	$ 68,401,160	
South Central Region—						
Corpus Christi, Tex.	$ 1,173,000		23,300,000			
Little Rock, Ark.	4,615,920*					*Army camp
Camp Brownwood, Tex.	4,197,564					
Alexandria, La.	4,242,655					
Tullahoma, Tenn.	8,637,000					*Camp Peay
Palacios, Tex.	1,628,923					
Houston, Tex.					$ 11,857,000	
Gadsden, Ala.					1,138,000	
Louisville, Ky.	972,000		67,400			
Dallas, Tex.	2,284,000					
Dallas, Tex.	3,472,000		750,000			
Duncan Field, Tex.			1,191,057			
Ft. Sam Houston, Tex.				$ 1,903,370		
Ft. Knox, Ky.	4,803,443	$ 1,935,000*				*F. W. A.
Ft. Clark, Tex.		163,000*				*F. W. A.
Galveston, Tex.	3,561,168					
Weldon Springs, Mo.					11,324,700	
Kansas City, Kans.	98,000					
Lake City, Mo.					7,246,375	

(Continued on page 46)

War—and Rock Products

National defense preparations will require cooperation of producers and manufacturers

By **BROR NORDBERG**

CONSTRUCTION AND PREPARATIONS for national defense are gaining momentum. The tempo of building for defense will reach a peak in 1941 and 1942 that will lean heavily on the rock products industries for construction materials. Every branch of the rock products industry will gain an increased volume of business.

Transportation costs define the profitable operating range for producers of sand and gravel, crushed stone, ready-mixed concrete and concrete products, all of which will play a major part in the construction program. Tonnage of these materials, so great as to materially increase national production figures, will necessarily be divided among producers located within reasonable distances of the various projects. To some degree, producers remotely located with respect to major construction centers will participate by the establishment of plants expressly built for or moved to the sites where local production is short of demands.

Portland cement, gypsum wallboard and sheathing, industrial sands and all other branches of the rock products industries will benefit, since all are necessary, if not considered essential, to national defense.

With contracts constantly being let and increases being made to construction now under way, it is difficult to estimate to what extent the rock products industries will be affected. The United States Bureau of Labor Statistics, Division of Construction and Public Employment, has compiled some figures which, while not broken down into every type of material, will serve to illustrate the magnitude of the building program.

Defense Demands for Materials

These figures are the estimated value of materials to be used in connection with the defense programs for the fiscal year ending June 30, 1941, as compared to requirements for the previous fiscal year. For the fiscal year ending June 30, 1941, the defense program will use sand and gravel to the extent of $83,362,000, according to this compilation. For the sake of comparison, the defense program's estimate for the preceding fiscal year was $10,009,000.

Portland cement value will be $78,268,000 for the fiscal year to Jan. 30, 1941, comparing with $9,243,000 the previous year. Stone, clay and glass products total $283,708,000 as compared to $37,989,000 for 1940. Another classification, for marble, granite, slate and other stone products, sums up to $29,513,000 compared to $4,959,000. Wall plaster and wallboard figures are $28,432,000 comparing with $2,995,000.

Other materials of the rock products industries no doubt are accounted for under a general heading, "all other materials," which totals $557,733,000 as compared to $26,539,000. Ready-mixed concrete is being used widely; but it is practically impossible to foresee what percentages of the sand and gravel, crushed stone and portland cement are to be used in ready-mixed form. Selection of the types of mixing for concrete are the responsibility of the various contractors and commanding officers at the job sites. Housing in connection with national defense is barely getting started, but concrete building units are reported to be in use on some recently let sizeable contracts in the Southwest.

The compilation of figures given includes, for the year ending June 30, 1941, regular appropriations in addition to emergency national defense appropriations; the First, Second and Third Supplemental National Defense Appropriation Acts of 1940; the National Defense Housing Act of 1940 and the Naval Authorization

Naval airport runway on the eastern seaboard. View shows gasoline-driven finishers working on 20-ft. paving slab

DEFENSE CONSTRUCTION AWARDS (Continued)

	Housing			Plant Facilities		
	Army-Navy	Civilian	Airports	Army-Navy	Industrial	Remarks
South Central Region (Continued)—						
Pascagoula, Miss.	2,000,000					
So. Charleston, W. Va.	1,527,000					
Morgantown, W. Va.					15,000,000	
Ft. Sill, Okla.	1,739,302					
Camp Wolters, Tex.	5,546,195					
Orange, Tex.	1,480,000					
Birmingham, Ala.		1,450,000*				
Selma, Ala.		779,000*				*U. S. H. A.
T. V. A. Jefferson City, Tenn.					20,000,000	*U. S. H. A.
Total	$ 51,978,170	$ 4,327,000	$ 25,308,457	$ 1,903,370	$ 66,566,075	*Dam
Pacific-Mountain Region—						
Alameda, Cal.			$ 10,539,000			
Puget Sound, Wash.		$ 2,003,000	6,995,000	$ 2,000,000*		*Piers
San Diego, Calif.	$ 3,071,072		3,521,000	2,655,000		
Seattle, Wash.		564,000*	600,297	2,000,000	$ 11,968,849	*U. S. H. A.
Tacoma, Wash.	751,120					
Ft. Lewis, Wash.	6,261,000					
San Pedro, Calif.					3,203,000	
Oakland, Calif.			1,800,000	1,151,000		
Ogden, Utah				1,030,000		
Los Angeles, Calif. (Ft. Ord.)	3,448,357					
Los Angeles, Calif.	5,063,000					
Long Beach, Calif.					11,254,700	
Downey, Calif.					4,294,798	
San Francisco, Calif.	858,000			158,500*		*Hospital
Ft. Barry, Calif.	241,400					
Moffett Field, Calif.			156,828			
Ft. Stevens, Ore.				10,250		
Bremerton, Wash.		1,812,300*				*U. S. H. A.
Ft. Huachuca, Ariz.	1,070,526	94,000*				*F. W. A.
Nacimiento, Calif.	6,018,733					
Mare Island, Calif.	858,000	2,400,000*				*U. S. H. A.
Ft. Logan, Colo.	115,645					
Portland, Ore.			1,071,854			
Hill Field, Utah			326,500			
Wendover Field, Utah			159,572			
Ogden, Utah			1,705,000			
Ft. Warren, Utah	1,970,720					
Vallejo, Calif.	2,243,418			29,800*		*Sewer system
Total	$ 31,970,991	$ 6,873,300	$ 26,875,051	$ 9,034,550	$ 30,724,347	
Off Continent—						
Coco Solo, Canal Zone	$ 859,529		$ 13,890,000			
Guantanamo, Cuba			4,965,000			
Western Pacific Islands			29,270,000			
Honolulu, H. I.				$ 1,458,000		
Hawaii	4,197,400			59,285		
Alaska	12,734,060	$ 1,625,000*	19,895,000			
Total off Continent	$ 17,790,989	$ 1,625,000	$ 68,020,000	$ 1,517,285		
New England	14,429,169	7,012,000	23,154,000	7,580,000	$ 63,033,000	
Middle Atlantic	33,093,567		278,700	43,448,770	88,369,004	
South Atlantic	37,780,109	9,206,000	31,720,711	2,560,028	68,401,160	
North Central	17,950,937	1,675,000	4,633,877		79,683,483	
South Central	51,978,170	4,327,000	25,308,457	1,903,370	66,566,075	
Pacific-Mountain	31,970,991	6,873,300	26,875,051	9,034,550	30,724,347	
GRAND TOTAL	$204,993,932	$30,718,300	$179,990,796	$66,024,003	$396,780,069	

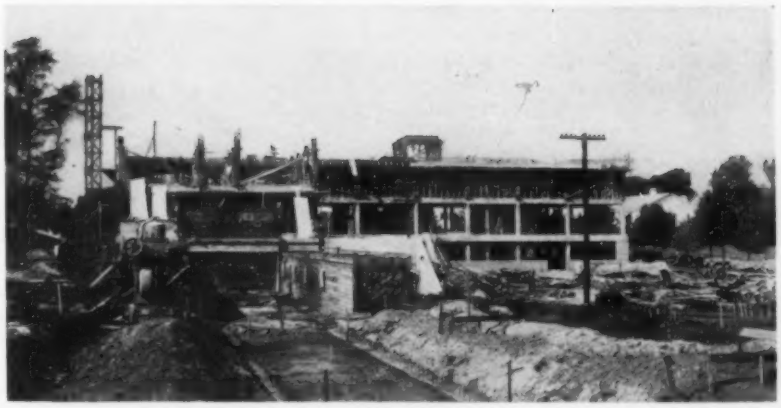
Acts. Figures for the year 1940 include the regular appropriations. Total estimated value of materials is $6,298,557,000 for 1941 and $459,508,000 for 1940.

Setup in Washington

It is evident from these figures that the role of construction for national defense is very important and that national defense is now and will be the largest single market for the rock products industries in 1941. In view of its importance we will endeavor to tell of the types of construction using products of our industries, discuss the specifications and show how some individual companies and plants are turning their activities from peacetime objectives to those of defense.

Construction work is divided into that done for the Army and that for the Navy. Construction department of the Navy is the Bureau of Yards and Docks and, for the Army, the Construction Section of the Office of the Quartermaster General. These agencies have at their disposal, through Congressional acts, an estimated total of almost $2,000,000,000 to be spent for construction, to which is added $720,000,000 additional money from the Federal Works Agency and other agencies. The National Defense Advisory Commission, made up of high-ranking industrial officials, has the power to approve or disapprove construction projects.

Other departments of the government, in addition to the Army and Navy, most of which are branches of the Federal Works Agency, are active in the defense effort on orders from the Army and the Navy. W.P.A. for example, is diverting some $250,000,000, or 25 percent of its appropriation, to national defense construction for both the army and navy. The U.S.H.A. has turned over about $30,000,000 of available funds to projects in defense centers.



Aberdeen Proving Ground, Maryland, Ballistics Laboratory under construction

Federal Works Agency will spend part of its $150,000,000 defense-worker housing appropriation through the Public Buildings Administration. The Public Roads Administration has authority to direct large sums of federal aid money to strategic highways and will probably spend $200,000,000 for that purpose.

As the picture now stands, the Navy will spend about $800,000,000 for construction and the Army about $1,200,000,000. Highways will get about $200,000,000 on defense construction, the Civil Aeronautics Authority will spend $40,000,000 on airfields, some $230,000,000 will be spent for housing through various government agencies and W.P.A. will function to the tune of an estimated $250,000,000 for miscellaneous construction at Navy Yards and Army centers.

Of the Navy's share of available appropriations, about $160,000,000 will go for continental airbases, which will be reflected in large contracts to coastal producers of aggregates. Navy yards and establishments will require about $213,000,000 on this continent alone. Agency shipbuilding and ordnance plants will utilize about $200,000,000 and $50,000,000 will go for defense workers' housing.

Army training camps will require the expenditure of an estimated $430,000,000, $100,000,000 will go for army posts, $100,000,000 for airbases in this country, $500,000,000 for agency munitions plants and $50,000,000 for defense workers' housing.

Prospects for Highway Construction

Prospects for the construction of a great system of defense highways are a matter of much speculation. Some government officials consider that we already have 75,000 miles of strategic roads most of which coincide with the more extensive federal-aid highway system. The same authorities are agreed that the highway system is not yet conditioned in its entirety to give the kind of service that is needed.

A study by the Public Roads Administration has been made to determine the shortcomings of the existing highway system. Data developed from this study show that 4000 miles of the strategic system are less than 18 ft. in width and that 14,000 miles are deficient in surface strength. Some 2400 bridges fall below the standards for strength and another 500 do not meet the 18-ft. standard of width or the 12½-ft. standard for clearance, or are deficient in both respects.

It is recognized that all road surfaces of the strategic system should be capable of supporting 9000-lb.

Map showing Quartermaster Corps procurement districts where most of the army buying is centered in the defense construction program. Offices are listed on the folding insert in this issue

wheel loads and that roads deficient in width should be widened immediately to a minimum of 20 ft. Sharp curves, steep grades and other factors that delay traffic must necessarily be modernized. These improvements are in need, but the construction of access roads and streets for Army and Navy reservations and for new and expanding defense industries are considered more urgent.

An estimate of the mileage of access road improvements needed for military and naval establishments alone shows a total of 2900 miles with an estimated expenditure of $194,000,000. In addition, new defense industries will require many more miles of roads. The Public Roads Administration and the W.P.A. are coöperating with the War Department in determining the need for access roads and streets at each military establishment and defense industry, the cost of the improvements and the money available. The immediate program does not include many important projects such as the construction of express highways through cities which must necessarily be part of the long-term highway program.

Typical of the winter difficulties under which aggregates and concrete batching plants must operate is this view of Kingston Trap Rock Co., plant at Fort Dix

Much of the rock products volume utilized thus far has gone into the construction of cantonments, buildings at permanent military establishments and into industrial expansion and new defense industries.

Types of construction involving the use of rock products are almost too numerous to mention. Industrial expansion for aircraft manufacture, etc., and the building of ordnance plants and other defense industries scattered over the country will require large tonnages of structural concrete, either mixed-in-transit or job-mixed. Airports are taking large tonnages of aggregates for runways of concrete, of asphalt type or soil-cement type and for foundations and floors for hangars, machine shops, warehouses and road building.

New Materials For Defense

CONSTRUCTION at military reservations employs modern materials and methods. Housing facilities for men in temporary cantonments are much more "permanent" and substantial in character than during the last war and are built with poured concrete piers, footings and floors with considerable use of insulating materials, such as mineral wool, above ground. Cement asbestos shingles are used extensively. Concrete pipe and manhole block are used for drainage and sewage at the camps.

Use Large Quantities of Gypsum Board

A new departure from ordinary building practice is the widespread use of gypsum sheathing in the building of cantonments, which is partly due to rising lumber prices and natural advantages of the gypsum product, such as its fireproofness and its better insulating value. Demand for gypsum board has become so great as to be considered vital to the national defense program. The gypsum industry is the only one producing construction materials over which some concern as to capacity was felt by the defense commission. A study was made of the entire industry in the face of a possible needed capacity of 3,000,000,000 ft. in one year which is said to be 50 percent greater than national production capacity. It has been since decided that present capacity in gypsum board will be adequate, although the industry will be taxed to capacity. The difficulty will be in supplying requirements for housing construction without too much interference with regular dealer business.

That gypsum board is part of the specifications for sheathing and lining the cantonments has an important indirect benefit to the gypsum industry. It had been hard to change the traditions of the building industry until the present emergency had proved the value of gypsum sheathing for housing construction. As a result, private builders are beginning to demand sheathing and, according to an executive of a prominent gypsum board concern, an annual volume demand of a billion feet annually in the building industry is likely to develop. Should this materialize, there will be a need for further plant expansion in the near future.

Soil-Cement Runways

Another new development is the use of cement-soil airplane runways. The Army laid down 41,000 sq. yd. of cement-soil pavement 6-in. thick at its new airbase at Westover Field near Springfield, Mass., to cover an area 150x2460-ft. The job was completed in 14 working days and before cold weather set in. Surfacing consisted of 11 percent portland cement by volume mixed with bank run gravel with a top size of 3 in. Soil at the base was too high in organic matter so gravel was brought in to hold down the cement content. If the runway holds up successfully through the winter months, others of the same material will undoubtedly be laid. At a second location, Brunswick, Maine, 75,000 sq. yd. of the same type runway has been placed.

Effect on Aggregates Industries

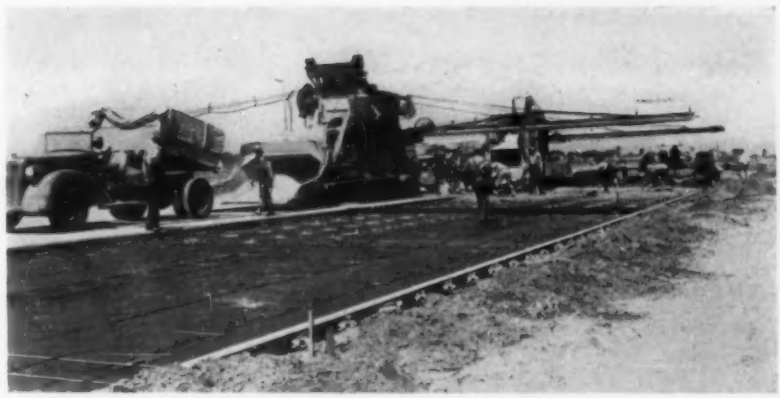
Observations as to difficulties under which producers of aggregates and ready-mixed concrete operate and methods employed where speed of construction is of utmost importance are based on visits to military and defense projects and interviews with producers principally in the East and Southeast. These visits were made during the early winter and by no means are all-inclusive. Many of the big projects have not started yet, but once they do the producer of materials must be ready to maintain two-shift and even seven-day operations. He must be equipped for cold weather operations and be able to operate under conditions which are often very difficult, and he must be equipped to guarantee certain minimum tonnage requirements, since the contractors are operating at top speed.

Contracts for the construction work in military establishments and government agency plants are let to

contractors and the producer becomes the subcontractor in each case. The Navy, through its Bureau of Yards and Docks, awards contracts for construction on a negotiated cost-plus-fixed-fee basis in the interest of speed and economy. Large, all-inclusive contracts are the rule. After a contract is signed, a Bureau public works officer and assistants are assigned to the site and the senior officer becomes, in effect, a member of the contracting firm. The local officer and contractor are then in complete charge.

Local construction quartermasters are stationed at each site by the army. The army likewise uses negotiated contracts for some of the cantonments and agency munitions plants but has handled much of its work by the competitive bid method. It also uses numerous small contracts at a particular job site instead of a single large contract. Private engineering concerns are engaged in some instances on design and work involving specifications.

Once the contracts are let, the contractor arranges for his material contracts, which is ordinarily done by the competitive bid method, although much depends upon the material producer's facilities and ability to deliver the material. As a result of the letting of different types of contracts at a site, the producer of aggregates or ready-mixed concrete either gets a blanket order for all the requirements of the job or a series of small orders which often amount to considerable volume in total. For these small contracts, there is an element of gambling in many cases where a producer has set up special handling facilities. He isn't certain how much business he will get.

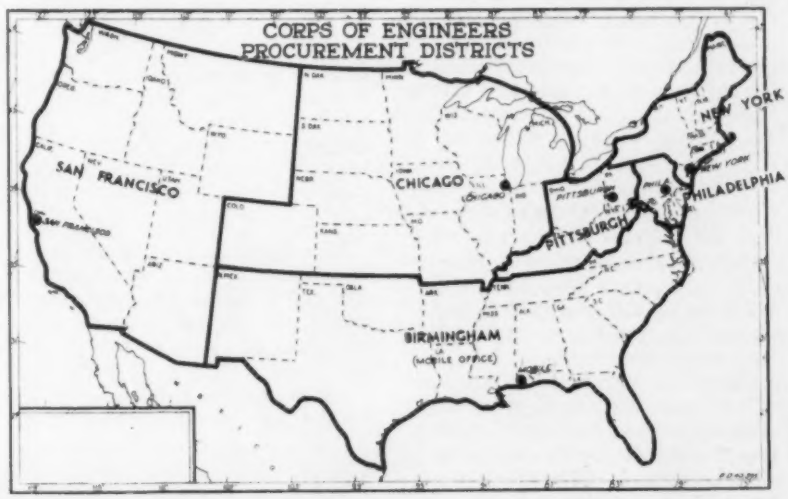


Constructing runways at Hill Field, Utah

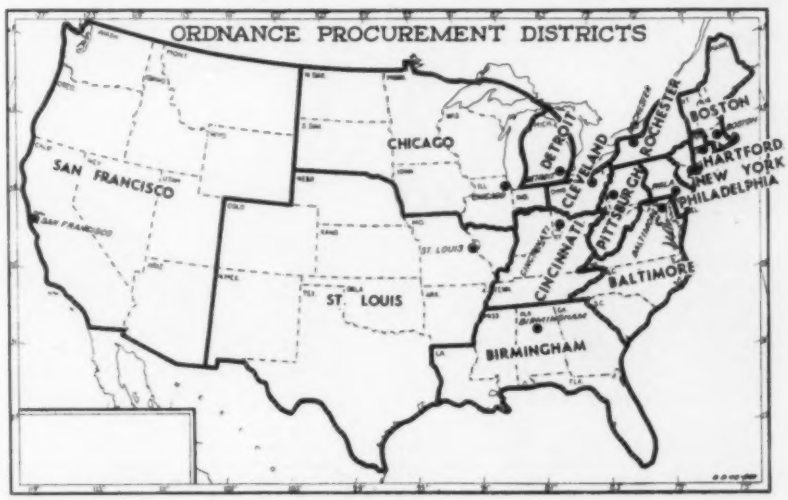
Ready-Mixed Concrete

Generally speaking, prices for aggregates or concrete are comparatively low but high enough to be profitable and to justify equipment expenditures provided the producer gets enough volume. Generally he does.

Ready-mixed concrete has come into its own on national defense work. It is being used by the contractor in almost every case where it is available in sufficient quantity. Requirements range anywhere from 10,000 cu. yd. up to 300,000 cu. yd.



Above: Army Engineers Corps procurement districts and headquarters' centers. Defense construction is now under the supervision of the Engineers Corps



Below: Map showing Ordnance procurement districts through which armament requirements will be purchased

for each ready-mixed concrete producer, and in practically all cases he is assured of a year's operation and has therefore set up batching facilities at the job site. In every case but two projects that were visited, the batching plant was set up just outside the military reservation to cut down the length of haul in transit mixers.

Practically all the producer contracts, for sand and gravel and crushed stone as well as ready-mixed concrete, have been let to established producers having approved equip-

(Continued on page 128)

No Work Stoppage for Frost

Tremendous tonnages of sand and gravel, crushed stone, and ready mixed concrete produced under difficult winter conditions

Final sizing unit and bins of plant built especially for national defense orders by Boston Sand and Gravel Co.

BOSTON SAND AND GRAVEL CO., Cambridge, Mass., largest producer of sand and gravel and ready-mixed concrete in New England is producing the bulk of the sand and gravel for construction at the new Naval Air Station, Quonset Point, R. I. Contractors for this $24,204,000 base are the George A. Fuller Co. and Merritt-Chapman and Scott Corp., New York, N. Y.

Concrete foundations, footings and slabs for hangars, shops and other buildings, are being poured by transit-mix concrete trucks operated by the contractors from their own batching plants on the reservation. It is estimated that upwards of 250,000 tons of aggregates will be needed. The gravel company, operating as a sub-contractor, has built a new, modern sand and gravel plant expressly for this job, and is trucking the aggregates from its plant 5½ miles to the contractors' bins.

Anderson Engineering Co., Cambridge, Mass., designed the plant for a capacity of 200 tons per hour in cooperation with the gravel company officials. Principal equipment was furnished by the Smith Engineering works; Anderson Engineering Co. conveyors were installed; and Boston Woven Hose Co. conveyor belting is used throughout.

At present, the entire output of the plant, which is often as high as 2000 tons daily produced in two 10-hr. shifts is in Navy 1-in. and 2-in. coarse aggregates and concrete sand for all types of concrete construction. Design of the plant is typical of the modern steel layout with some special provisions made necessary by the characteristics of the deposit under excavation.

Deleterious Material Removed by Crushing and Screening

A suitable bank of sand and gravel was located in August, 1940, and tested thoroughly before the plant was designed in order to insure passing the Navy specifications. The material contains about 60 percent gravel, and has some large boulders that are wasted over a rail grizzley. Its origin is a glacial moraine outwash plain, and it does contain some decomposed granite that breaks down readily under crushing. As a precautionary measure, this material is removed by screening after crushing and does not enter the sand stream in the washing plant. Gravel sizes are such that the coarse aggregates contain a minimum of 40 percent crushed material.

Excavation is done by a Lorain Diesel-gas 1¼-cu. yd. shovel, loading into end-dump trucks, which haul a very short distance to a rail grizzley set at 12- x 20-in. over a hopper. No attempt is made to break up the boulders which fail to pass the grizzley because there isn't time, although it is apparent from the grizzley setting that larger than ordinary boulders are being handled through the plant. It was not economical or practicable to locate a primary crusher at the hopper under the conditions encountered.

The plant consists of a crushing unit independent of the washing and screening unit, using belt conveyors for all the transportation and elevation. Under the hopper at the rail grizzley, a 30-in. by 5 ft., 6-in. Telsmith plate feeder, V-belt driven by a 5-hp. motor, regulates the flow of material on to a 30-in. belt conveyor, 133-ft. centers, which feeds the crushing plant. This conveyor is equipped with skirt-boards to prevent large cobbles rolling off.

Two scalping screens operate in connection with crushing which is done through two crushers and without application of water. The feed conveyor discharges into a No. 450 Telsmith rotary grizzley which rejects plus 4-in. material into an 18-x 30-in. jaw crusher driven through V-belt by a 60-hp. motor. Everything passing the rotary grizzley flows over a 5-x10-ft. single-deck Telsmith "Pulsator" vibrating screen and the oversize (2½-to 4-in.) is put through a No. 36 Gyrasphere

Crushing arrangement to produce a more desirable material. Incoming belt from feed hopper on right discharges to revolving grizzly at top. Overs go to jaw crusher on right, below; the balance going to scalper screen. Overs from this screen go to gyratory crusher. Crushed material recirculates by belt, lower right

and Snow

Transfer point where crushed gravel returns to primary belt which carries material to crushers after screening out crusher fines. Note skirt boards to prevent boulders falling off belt

crusher driven by a 75-hp. motor through V-belt. Minus 2½-in. material drops to a belt conveyor feeding the screening plant.

Both crushers are set to a 1⅛-in. opening on the closed side and discharge on to a single 24-in. belt conveyor, 96-ft. centers, for transference to the 30-in. belt conveyor coming from the truck hopper. Located at the point of transfer is a second scalper, a 3-x8-ft. double-deck Pulsator, which screens out the fines. A top deck of 1-in. cloth is merely protection for the other which has ⅜-in. square openings. Practically all the material through this screen deck is minus ¼-in. containing material that fractured down in crushing. It is dropped to the ground as waste, and the rest of the material returns to the crushing plant. Removal of the fines from crushing is done to improve results in testing the finished products for soundness.

Making Aggregates for the Navy

Minus 2½-in. material is elevated to the washing and screening plant over a 24-in. belt conveyor on 135-ft. centers which discharges into a 60-in. by 18-ft. rotary Telsmith standard washing screen driven through V-belt by a 30-hp. motor. Water is applied under pressure into the stream of material as it comes off the end of the conveyor and inside the revolving screen. A 10-ft. scrubber section precedes the screening surface, and a sand jacket 12-ft. long makes the separation for sand production. Navy 1-in. gravel is sized through the screen directly into the bins below and Navy 2-in. is produced by blending with some of the 1-in. product in chutes to the bin. Sand is washed and dewatered through 48-in. and a 36-in. rake classifiers, both of which produce identical finished concrete sand products, which contain about 1 percent minus 100-mesh fines.

New plant for naval base construction materials. Primary belt is shown in foreground leading to crushers and vibrating scalping screen to remove crusher fines. Note how fines are wasted

Total bin capacity is 200 cu. yd. in three sizes, from which the finished products are drawn into trucks through 18-x18-in. Telsmith duplex bin gates. Water consumed is about 800 g.p.m. pumped from a nearby stream. All the plant drives are roller chain, chain and sprocket or V-belt. All equipment is electric-motor-driven for which 0.7 miles of electrical lines carrying 550 volts were run to the plant from a nearby town.

Plant operation started in September and was to continue, weather permitting, until January 1, 1941, when the plant was to be shut down until March. It has operated already down to 16 deg. F. temperature. Before the shutdown for the Winter, the plant operated at full capacity in an attempt to build up a 25,000-ton stockpile of sand and a proportionate tonnage of gravel in anticipation of Winter demands for construction. Gravel was being trucked to the job for stockpiling and sand was being stocked at the plant, since drainage is needed. Sand, when used immediately upon delivery, is drained 24 hr. in stockpiles and then loaded into trucks.

Hauling is done in 12 Sterling trucks which carry 10 tons to the load. It is anticipated that the plant will operate at least during 1941 at this location and that it will also furnish gravel for road construction. Probably one-half of the employes are from other plants of the company. D. D. Reynolds, secretary of the Boston Sand and Gravel Corp., is in charge of operations.

Big Crushed Stone Contract for Military Roads

General Crushed Stone Co., Easton, Penn., has one of the largest single contracts for crushed stone to date for production at its Watertown, N. Y., plant, located eight miles from the Pine Camp military reservation. About November 1, the contract broke, involving the production of several hundred thousand tons of crushed stone to be used in building about 34 miles of roads within the reservation.

There was no time to increase production and requirements are for all the stone that can be produced and delivered in order to complete the job by March 1, 1941. Probably 200,000 tons of 5-in. stone will be needed for road base, and an additional 100,000 tons for topping. The plant, which has a normal production of 150 tons per hour, is normally shut down during the Winter since its location is in extremely cold climate. Starting operation on two 10-hr. shifts, it is now employing men from other inactive plants of the company

Construction of buildings at Pine Camp will also involve about 40,000 tons of crushed stone and 20,000 tons of sand for concrete. Sand will be furnished from General Crushed Stone Co.'s sand plant at Lacona, N. Y., 35 miles from Watertown. Sand was being stockpiled when weather permitted. Clark Trucking Co., Syracuse, N. Y., has set up a batching plant to deliver the concrete in transit mixers. John W. Cowper, Buffalo, N. Y., and Senior and Palmer, New York, N. Y., are the con-

Transit mixer units mounted on flat cars to reach pouring operations inaccessible to trucks. Steam plant is shown in the background

Ready Mix Units On Flat Cars

CLEVELAND BUILDERS SUPPLY CO., Cleveland, Ohio, has a contract that will amount to several hundred thousand cubic yards of ready-mixed concrete to be used in construction at the new Ravenna Ordnance plant being built by the War Department near Ravenna, Ohio. Estimated construction cost of the project is $11,564,500. The contractor is The Hunkin-Conkey Construction Co., Cleveland.

Much of the concrete is to be used in building concrete "igloos" for storing war materials. These storage magazines are to be at scattered locations and at places inaccessible to trucking equipment during the construction period. These difficult conditions call for unusual operating procedure. The Cleveland Builders Supply Co. has set up a plant and delivery equipment for transportation of ready-mixed concrete by rail at large capacities. It is probably the only ready-mixed concrete operation of its kind.

A batching plant designed and built by the Blaw-Knox Co. for an 8-hr. capacity of 1000 tons has been erected inside the grounds and has been completely fitted for winter operation. When operations begin at expected capacities, all aggregates and cement are to be delivered to this plant by rail. Crushed slag, graded from the No. 4 sieve to ¾ in., is the single size of coarse aggregate. It is produced by the Standard Slag Co. and shipped by rail from Youngstown, Ohio, and Warren, Ohio. Sand contracts are to be divided between the Rubber City Sand and Gravel Co., Akron, Ohio, the Hugo Sand Co., Kent, Ohio, and the Industrial Silica Corp., of Youngstown.

The batching plant has a bin capacity of 150 tons in three compartments, a 300-bbl. bulk cement bin for standard portland cement and a 4-cu. yd. weigh batcher for aggregates. Cement is being unloaded from hopper-bottomed cars into a hopper and conveyed into an enclosed bucket elevator by screw conveyor. A Bin-dicator at the top of the cement bin is the means of preventing over-filling.

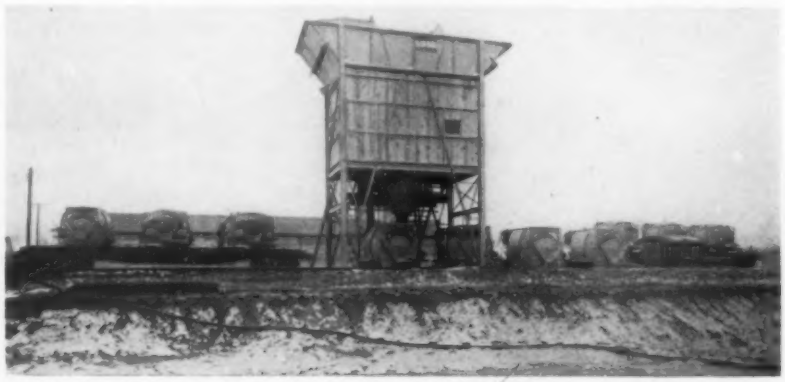
In weighing out the cement for a batch of concrete, it is drawn from its bin and conveyed into a weigh hopper adjacent to the one for aggregates by an inclined screw conveyor. Operation of the cement batcher is entirely automatic. Having set the scale, a starter button is pressed, and the handling of cement takes care of itself with an automatic shutoff.

Aggregates are not to be handled directly into the bins but are to be stockpiled direct from cars, using Jeffrey portable belt conveyors, and are to be re-handled by locomotive-crane into the bins. Large stockpiles of aggregates necessarily will be stocked near the plant as a guarantee of a supply for the Winter months.

Stockpiles are to be heated by live steam, the bins are equipped with live steam jets, and live steam will heat the mixing water. A 75-hp. Kewanee boiler and 12,000 gal. water tank have been installed for the purpose. The batching plant is completely enclosed for winter protection and will operate whenever the contractor is able to pour concrete.

All the concrete is to be handled as transit mix, and a most unusual arrangement has been developed for delivering it to pouring locations because of inaccessibility due to lack of roadways. At first, it was planned to transfer truck mixers from the company's operations in Cleveland but, instead, ten new 4-cu. yd. transit mixers were purchased for this contract. Half of them are Jaeger and the others Blaw-Knox. They have been rigidly mounted, complete with their driving mechanisms, on standard gauge flat cars, two of which carry three mixer drums and the other has four. All discharge spouts are on one side. A car is spotted under the batcher by a locomotive. It is expected that the plant will be capable of batching three drums in five minutes, with one batching operation sufficient for one mixer.

Water is added at the batching plant, and the concrete is mixed in transit on the flat cars while being transported a distance of two or three miles. At destination concrete is transferred out of the mixing drums into 1-cu. yd. buckets, two to a car, which are then transported on narrow-gauge track to the pour-



Batching plant which proportions aggregates and cement for 1000-cu. yd. of concrete in an 8-hr. run, dumping into rail-mounted transit mixers

ing location. A crane then handles each bucketful to the forms.

This arrangement to meet abnormal conditions required close cooperation between the producer and the contractor. The contractor laid the trackage and furnishes a switchman and conductor on each car. He also dug two wells to furnish needed water with automatic pumps at the rate of 40,000 gal. per day. A mixer man is required on each car.

On December 16, the first pour was made from this plant. Three-shift operation, 24 hr. a day, is anticipated with an output of 3000 cu. yd. a day. Some of the key men from Cleveland have been stationed at the plant, which is operated under the supervision of H. D. King. Mr. King had previously been in charge of operations at Dock 5 in Cleveland.

H. C. Nutting Co., engineers, is doing all the testing and has set up a testing laboratory at the site. Wilbur Watson and Associates, Cleveland, Ohio, the architect-engineer firm in charge, has drawn up the specifications in coöperation with the Army construction quartermaster.

Portland cement comes under federal specification SS-C-191a and sand is governed by A. S. T. M. C58-28 and A. S. T. M. C33-39 procedure. Concrete aggregates are required to conform to federal specification SS-A-281 and to meet the approval of the commanding quartermaster. Concrete for this type of work is the regular Class B of 1:2:4 proportions discussed in the specifications; sand is required to pass a ⅜-in. sieve and have 15 percent retained on the No. 8 sieve and a minimum of 95 percent on the 100-mesh; and the coarse aggregate must be graded between ¼- and ¾-in. with a maximum of 10 percent retained on the No. 4 sieve. Concrete without reinforcement will have a coarse aggregate of ¼- to 1½ in. which is Class A. It is further specified that concrete may not be poured at temperatures below 40 deg. F., and a rising temperature curve without permission of the quartermaster.

It is also required that for concrete exposed to the elements and in contact with the earth, or where rapid stripping is required, that a ferric-aluminum-silicate puzzolan material be mixed into the concrete, to permit a more workable mix with less water and to expedite curing. "Puzzolith," a product of the Master Builders Co., is being introduced in proportions of 2 lb. to the sack of portland cement. The batch plant is to be equipped for weighing this material along with the aggregates.

Continue Concrete Deliveries In Below-Freezing Temperatures

P. J. Keating Co., Fitchburg, Mass., set up a new batching plant in July 1940, just outside the grounds of the War Department's new Northeast Air Base at Chicopee Falls near Springfield, Mass. Yardage of concrete at this site was indefinite but in December had already called for 20,000 cu. yd. for airplane hangar construction alone.

This plant is located a hauling distance of 1 to 1½ miles from the construction, and is set up against a hillside so that trucks can dump directly into the bins. Cement is handled in sacks. The plant consists of a Blaw-Knox steel bin of 150 tons capacity in three sizes, with a 2-cu. yd. weigh batcher, and is completely housed-in for protection during the Winter. Mixing water is heated and there are steam jets inside the aggregates bins.

Aggregates are a crushed trap rock trucked in from the John S. Lane and Son, Inc., quarry at Westfield, Mass., and sand trucked from a local sand and gravel plant. Engineers at this project were particularly concerned with having workable concrete and utilized the past experience of other government agencies in approving sources of aggregates. The quarry furnishing trap rock had revamped its crushing operations in recent years and had installed more reduction stages in crushing with very good results in the elimination of elongated pieces and flats. Some minor changes were made in the sand plant to increase fines.

Bulk of the concrete is Class B with theoretical proportions of 1:2:4 which have been changed to 1:2½:-3½ to produce a more workable mix. Two new Rex 4-cu. yd. truck mixers on International trucks were purchased, increasing to seven the company's fleet of Rex and Jaeger truck mixers operating at Worcester, Mass., Fitchburg and Chicopee Falls. Concrete is mixed in transit as the trucks leave the plant—the requirement being for a minimum mixing time of four minutes. Deliveries have been made at temperatures well below freezing, and at the rate of 125-cu. yd. in 8 hr. with two mixers.

At Chanute Field, Rantoul, Ill., an immense housing project is under way to house 16,000 Army Air Corps students. The entire project when completed will cost about $14,000,000. During 1940 the airport runways have been lengthened, requiring 350,000 sq. yd. of 8- x 6- x 8-in. standard pavement equivalent. Concrete for this work was provided with standard paving equipment, with batching done on the site, but a large quantity of ready-mixed concrete was furnished by O'Rourke Concrete Builders Supply Co., Rantoul, Ill., for footings and piers of the temporary wooden barrack buildings, mess halls, etc.

Although permanent structures are of brick masonry, the main mess hall is of structural concrete with concrete block back up in the walls which have a brick masonry facing. Two mess halls now under construction will have a poured concrete foundation, using ready-mixed concrete, and

New batching plant set up near Westover army air base at Chicopee Falls, Mass. Note that aggregates are placed into bins without the use of an elevator and that plant is enclosed for winter operation

light weight concrete masonry units in the walls painted on the outside with portland cement paint. About 49,000 standard units or equivalent will be required.

Seven-Mile Haul for Concrete

CONSTRUCTION SERVICE CORP., Springfield, Mass., is also furnishing about 20,000 cu. yd. for various kinds of construction at the Chicopee Falls army air base, but is delivering concrete direct from its permanent plant, a 7-mile haul. This concern produces its own sand and gravel aggregates at a plant six miles from Springfield. The only effect on the aggregates production was to build larger stockpiles. About 25,000 cu. yd. were stocked as of December.

For ready-mixed concrete, mixing water is heated and the aggregates bins contain steam coils. Delivery equipment consists of seven Rex and three Jaeger truck mixers of 4-cu. yd capacity. Having a haul of seven miles, it is required that mixing be done at the job upon delivery.

The company also had the contract for a 150- x 5000-ft. airplane runway, constructed of 2-in. asphalt-gravel thickness of base and a 1-in. top thickness, requiring 14,000 cu. yd. of cold asphalt mix furnished by this company at a plant it operates near its gravel deposit.

Normally, this concern delivers comparatively little ready-mixed concrete during the Winter months, but this year will enjoy an average volume the year round as the result of the national defense program.

One of the new 6-cu. yd. transit mix trucks mounted on a semi-trailer, operated by Harry T. Campbell Sons Co.

Long Hauls For Ready-Mix

HARRY T. CAMPBELL SONS CO., Towson, Md., producer of crushed stone, sand and gravel and ready-mixed concrete, is furnishing ready-mixed concrete from a single batching plant to three different army authorities in connection with national defense. The company is the sub-contractor for construction of the Edgewood Arsenal and Aberdeen Proving Ground, Aberdeen, Md., and army engineers who are supervising various construction jobs aside from the principal projects. Construction contractors for the arsenal and proving ground projects, estimated to cost $5,898,391, are the Cummins Construction Corp. and the Riggs Distler Co., both of Baltimore, Md.

As of December 1, 125,000 cu. yd. of ready-mixed concrete were under contract and deliveries to the several locations were being made out of the Campbell plant at Cowenden, Md., on the new Philadelphia to Baltimore highway.

Several years ago, the company had built a sand and gravel plant at this location to furnish aggregates for construction of the highway. At that time a bulk cement batching plant had been erected just across the road from the gravel plant. Before defense contracts were let in September, 1940, ready-mixed concrete was handled by batching out aggregates at the sand and gravel plant, with the trucks stopping on the other side of the highway to get cement.

To expedite operations, under heavy demands, a Blaw-Knox batcher was set up alongside the cement bin and the dispatcher's office was moved over. About 500 tons of aggregates are handled in batch bins, two sizes of gravel and one of sand, using a 20-in. bucket elevator to fill the bins. A 12-in. elevator is to be installed to handle concrete sand. Maryland highway specification aggregates are acceptable for all contracts.

The plant is entirely enclosed, has a Clarkson steam generator to develop steam to heat the mixing water and the aggregates through jets, and has a 3-cu. yd. weigh batcher.

Hauling distance in transit mix trucks ranges from 12 to 20 miles, which is unusually long, but most of it is over highway U. S. 40. Large capacity truck mixers were purchased to handle the job. The company now operates 28 truck mixers of 6-, 5- and 3-cu. yd. capacities 23 of which are in service on national defense jobs, and five of which are retained at the company's crushed stone plant at Texas, Md., to handle normal Winter volume. These trucks are Jaeger, Rex and Blaw-Knox and the chassis are International, White and Macks. Nine of the mixers, including the six 5-cu. yd. Jaeger "High Dumps," are new, and three of the five 6-cu. yd. mixers are mounted on semi-trailers.

New Batch Plant to Reduce Hauling Distance

When operations began, a request had been made for 125 cu. yd. of concrete a day, but the plant has been required to handle as much as 500 to 600 cu. yd. in nine hours. There have been some seven-day per week deliveries. A lot of small contracts are being let on this work, and there is anticipated a year of operation before completion. In December, the company was installing a new temporary Blaw-Knox batching plant of 110-ton bin capacity at Magnolia, Md., which will reduce the hauling distance to nine miles. When completed, it is expected that five additional mixer trucks can be released for other deliveries. Cement will be received at this plant in bulk on the Pennsylvania railroad.

Ready mixed concrete plant across highway from sand and gravel plant of Harry T. Campbell Sons Co., which is operating 100 percent on defense orders

AMERICAN

AMERICAN portable crushing plant reducing "run-of-mine" stone to ¾" aggregate in one reduction at the rate of 300 tons per day.

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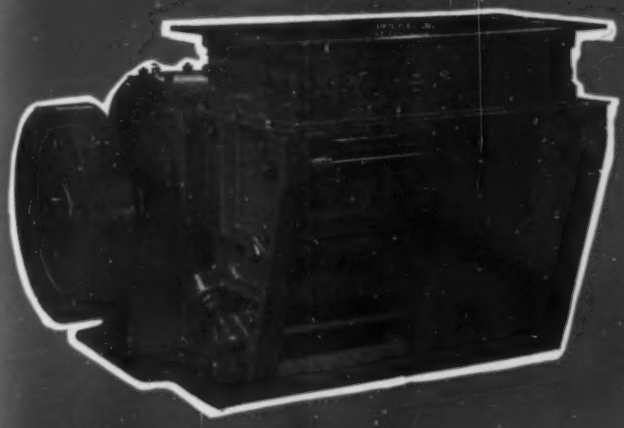

Front view showing screen plate adjustment.

Back view equipped with chain drive.

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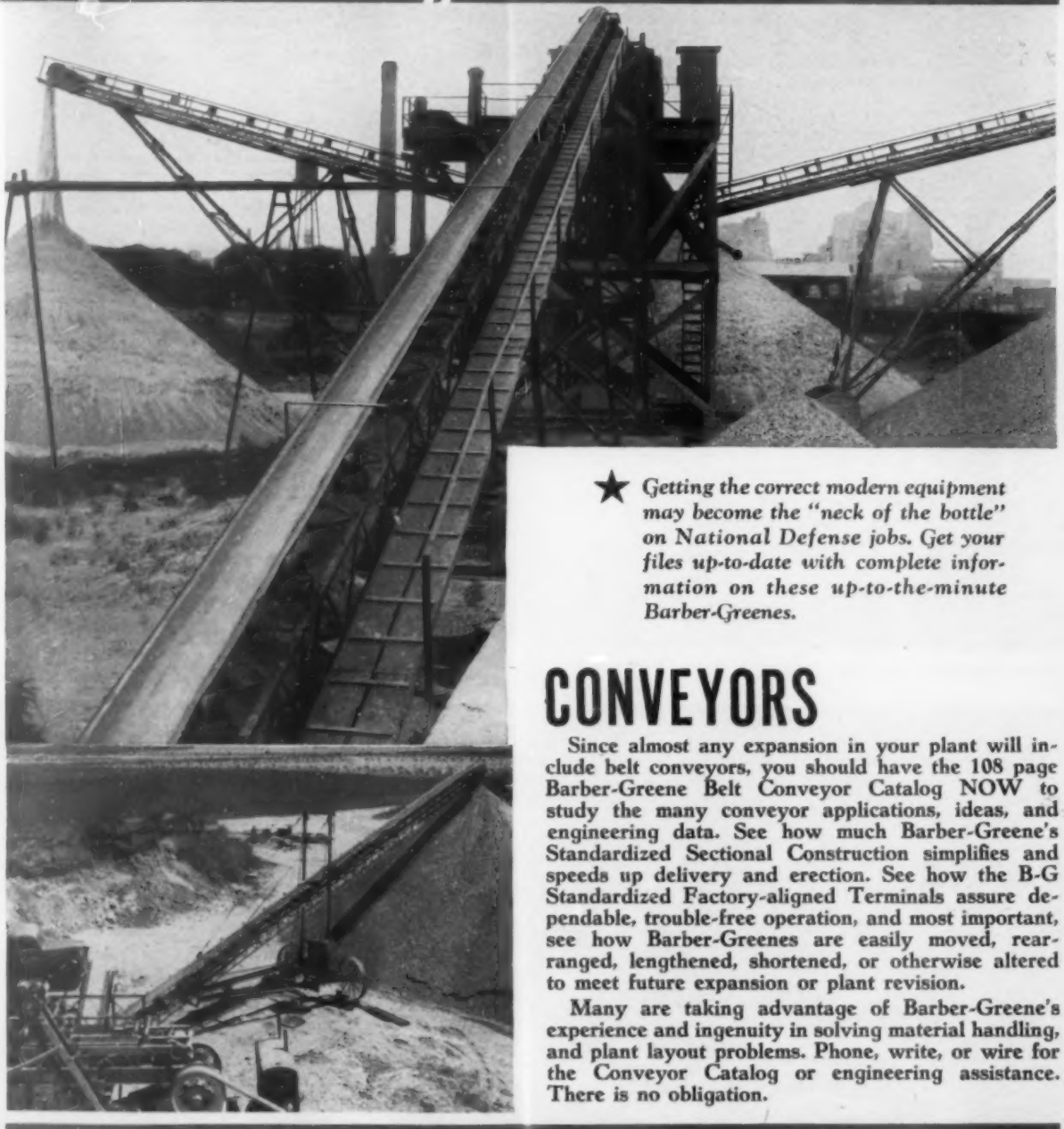

★ *Getting the correct modern equipment may become the "neck of the bottle" on National Defense jobs. Get your files up-to-date with complete information on these up-to-the-minute Barber-Greenes.*

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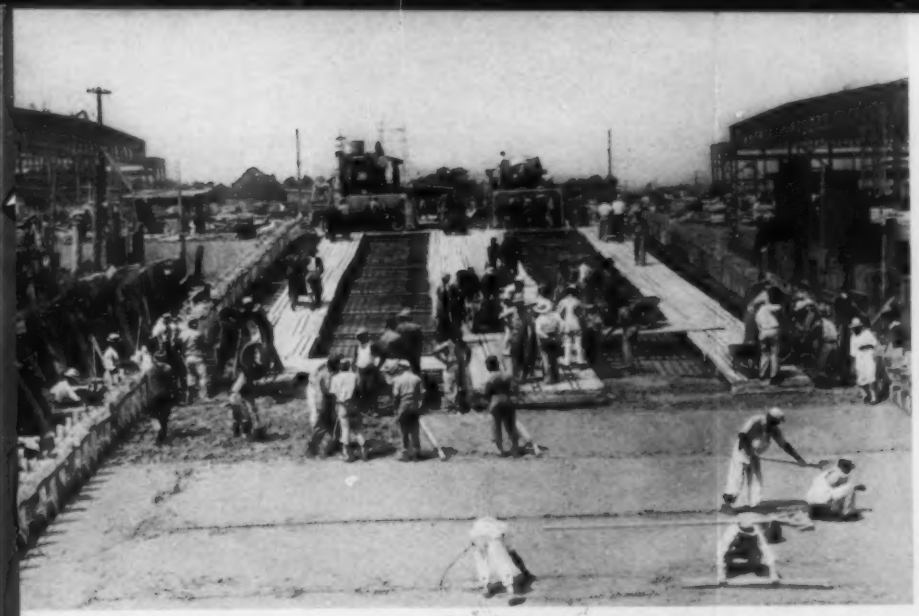

Official Photograph United States Navy

Left: Typical reinforced concrete construction at a Navy seaplane base. Workmen are pouring slab from transit mixers for a seaplane ramp

Below: Construction view of administration, barracks, mess hall and galley buildings at a west coast air port

Official Photograph United States Navy

Photograph by U. S. Army Air Corps

Billions for Defense Construction

WITH TWO BILLION dollars appropriated by Congress for defense construction to be expended through June 30, 1942, the rock products industries are very much concerned as to their portion of this vast sum. Preliminary estimates indicate that a little less than $300,000,000 will be spent for cement, lime, gypsum, crushed stone, and sand and gravel. Included in this estimate are the cement and aggregates going into ready mixed concrete and concrete masonry products, and the various gypsum products. Detailed figures for each product may be obtained from the article on the complete defense construction program in this issue.

"How can I get my share of this business?" is the question in the mind of every producer. Except for isolated cases, all materials will be purchased under sub-contracts from general project contractors. While it was generally believed that these sub-contracts would be awarded by competitive bidding, as a matter of actual practice some of the awards are being made through direct negotiation with the general contractor. It is therefore essential that every producer be "on his toes" following up the placing of general contracts so that he can make his contacts direct. To this end ROCK PRODUCTS is listing below information as to army and navy procurement offices. Reference should also be made to the tabulation of defense construction contracts in the general defense article in this issue.

All large contracts are cleared through the National Defense Advisory Commission in Washington, which is now headed by W. S. Knudsen, representing industry; Sidney Hillman, representing labor; Secretary Knox of the Navy, and Secretary Stimson of the Army. Edward R. Stettinius, Jr., is directly in charge of the Raw Materials division, and Donald M. Nelson is purchasing coördinator for the entire commission.

Army purchases are made through the Quartermaster General's office (Brig. Gen. C. D. Hartman), and the Navy purchases are handled through the Bureau of Yards and Docks (Rear Adm. Benjamin Moreell). These two branches of the army and navy, coöperating through the National Defense Advisory Commission, deal directly with contractors and with the following government agencies: Federal Works Agency, Public Building Agency, WPA, United States Housing Authority, and the Public Roads Administration. Under a new ruling, the Army Engineer Corps will supervise construction projects but the Quartermaster Corps will complete existing work and handle contracts up to the point of construction.

Army Quartermaster Corps Offices

Atlanta, Ga., 1306 Marietta Bldg.
Boston, Mass., Quartermaster Depot, Army Base
Brooklyn, N. Y., First Avenue and 58th Street
Chicago, Ill., 1819 West Pershing Road
Detroit, Mich., 611 Federal Bldg.
Jeffersonville, Ind., Tenth Street and Meigs Avenue
Philadelphia, Penn., Twenty-first and Johnson Streets
St. Louis, Mo., Second and Arsenal Streets
Fort Sam Houston, Texas
San Francisco, Calif., Fort Mason

Navy, Bureau of Yards and Docks

Alameda, Calif., Naval Air Station
Anacostia, D. C., Naval Air Station
Annapolis, Md., Naval Academy
Boston, Mass., Navy Yard
Charleston, S. C., Navy Yard
Dahlgren, Va., Naval Proving Ground
Great Lakes, Ill., Naval Training Station
Indian Head, Md., Naval Powder Factory
Key West, Fla., Naval Station
Lakehurst, N. J., Naval Air Station
New London, Conn., Submarine Base
New York, N. Y., Navy Purchasing Office
Newport, R. I., Navy Purchasing Office
Norfolk, Va., Naval Air Station
Pensacola, Fla., Naval Air Station
Philadelphia, Penn., Navy Yard
Portsmouth, N. H., Navy Yard
Puget Sound, Wash., Navy Yard
Portsmouth, Va., Norfolk Navy Yard
San Francisco, Cal., Navy Purchasing Office
San Diego, Calif., Naval Air Station, North Island and Naval Supply Depot
Washington, D. C., Navy Yard
Yorktown, Va., Naval Mine Depot

(Listing of offices of government reports appears on page 112)

Left: Airplane view of Chanute Field, showing runways, aprons, and hangers in the right foreground. Back of the hangers are the permanent barracks, and to the extreme left, are temporary barracks

Below: Preparing soil-cement runway at Westover Army Airport near Springfield, Mass. This job was completed before cold weather set in. Others of the same material will undoubtedly follow

Left: Modern bar
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concrete tent f

Right: Typical of
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slip of concrete

Below: Map show
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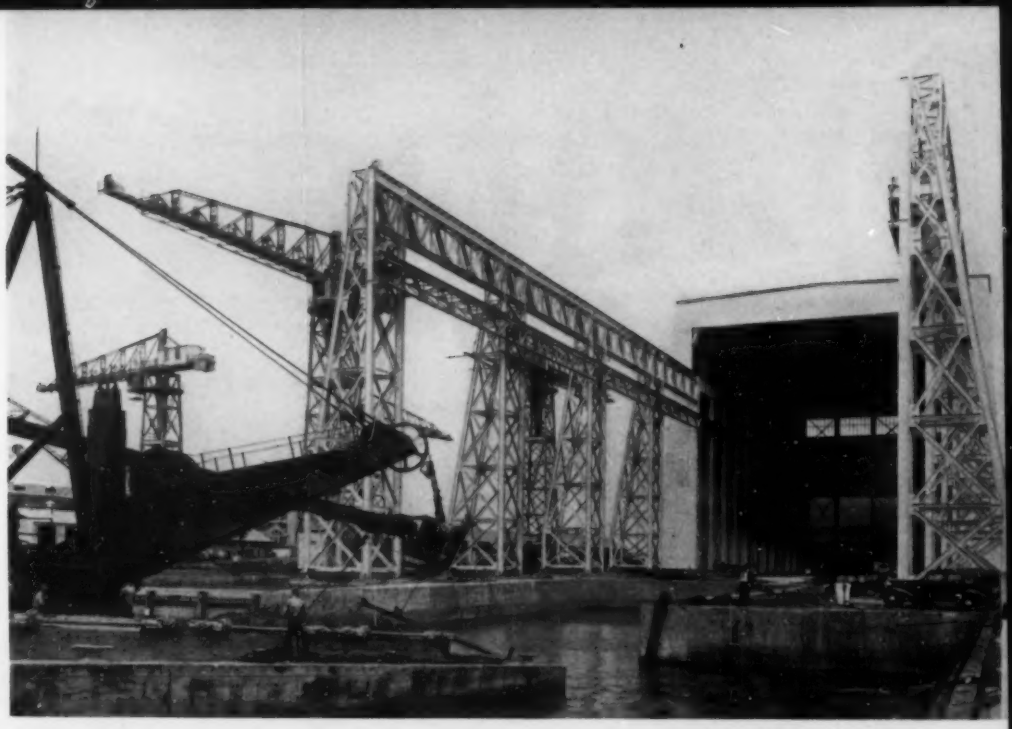
Above: Concrete piers for cantonment at Indiantown Gap, Penn. Mobility of transit mixers lends itself to these small pourings

Below: Barrack walls at Indiantown Gap cantonment are covered with gypsum sheathing. Barracks are built on concrete piers, shown above

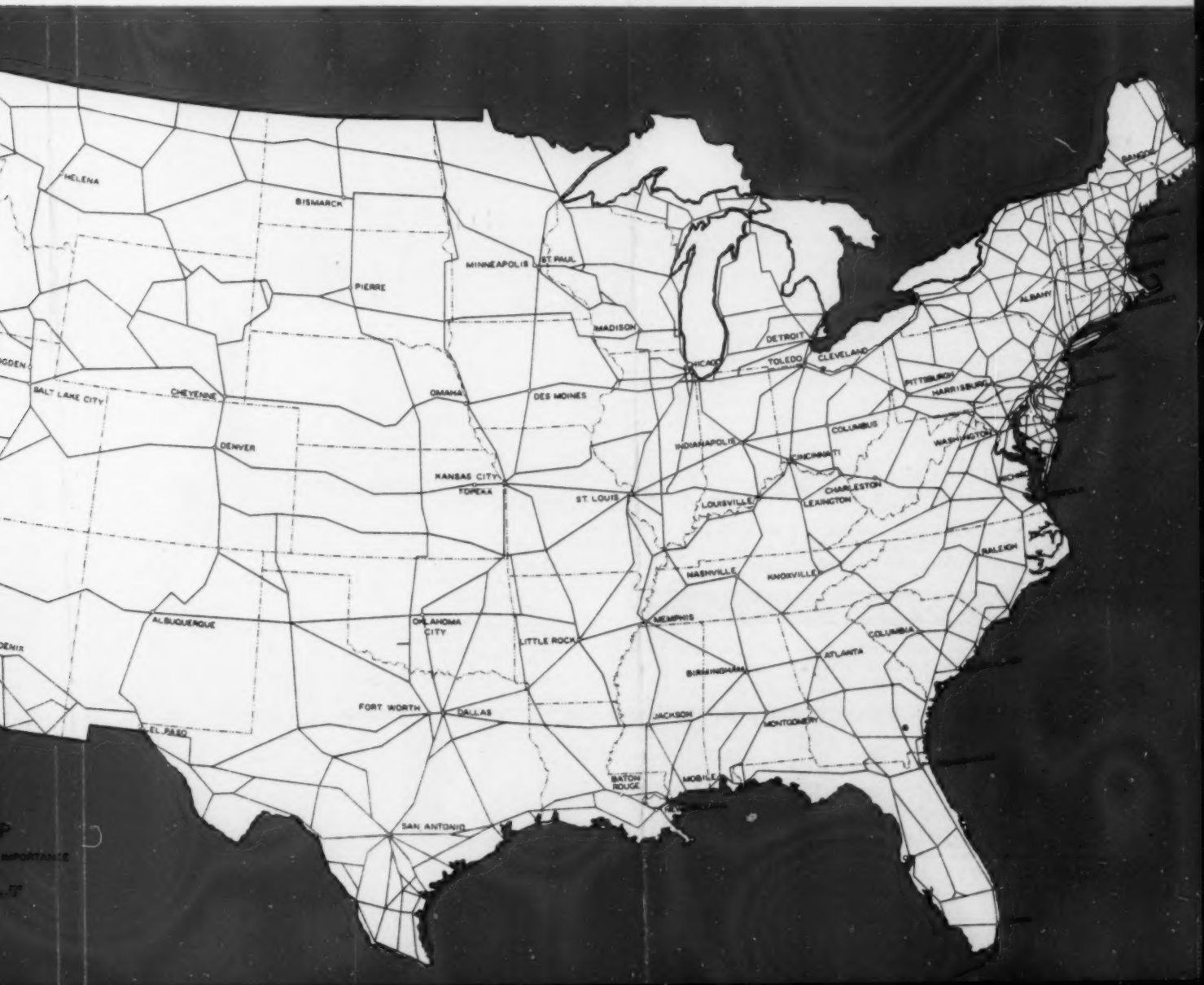
Modern barracks at Fort Ripley, Minn., concrete floors, concrete masonry walls, concrete tile roofs. Several thousand crete tent floors also have been laid



Typical of the heavy dock repair con- ion of the Navy is this shop and barge of concrete on the eastern seaboard

Official Photograph, United States Navy

Map showing highways of the United which have been designated as strate- ads that will receive first consideration. and inter-camp roads are also con- ered of vital importance for defense



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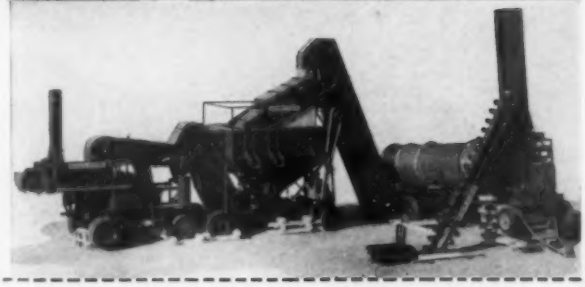
The Pneumatic Tired Mounted Model 522 (above left) has made bucket loader history. Available with low boom and swivel conveyor or with conventional high boom and spout as shown. It has proven to be not only the answer for the small operator, but ideal on small or scattered jobs in large plants.



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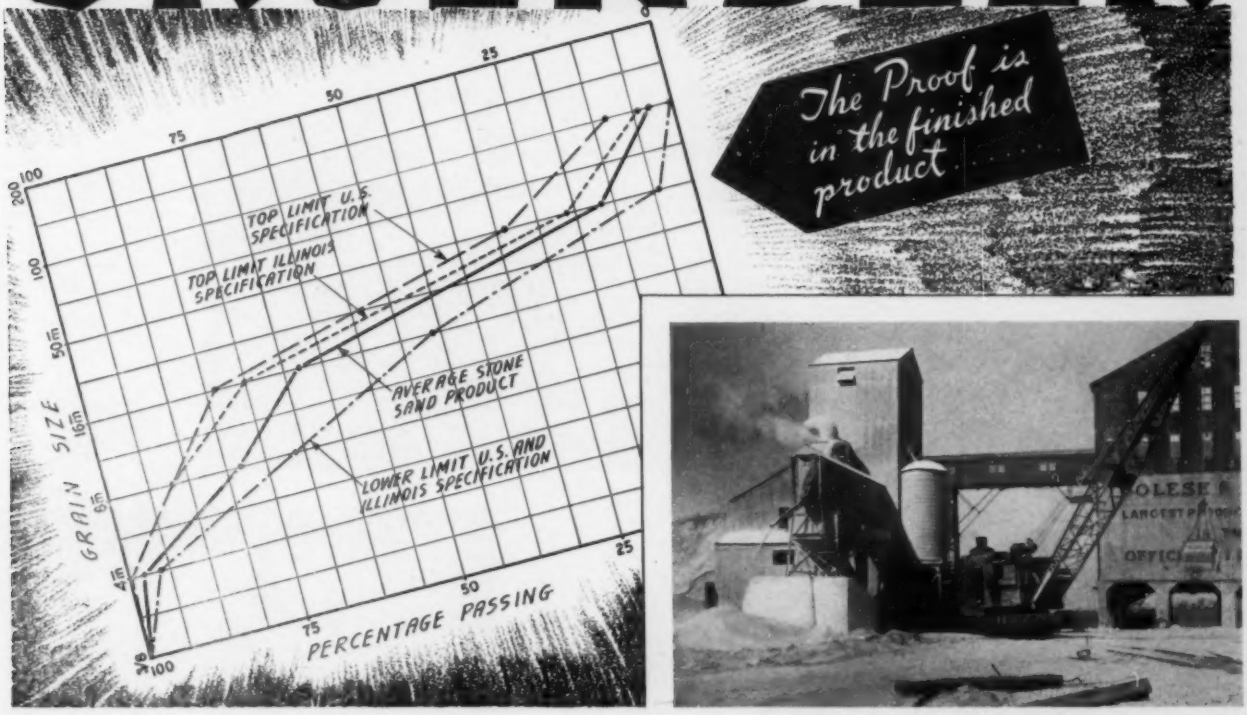
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NEW GRUENDLER RING HAMMER CRUSHER MAKES PERFECT STONE SAND

This new Ring Hammer Crusher is the result of fifty-three years of constant effort by Gruendler engineers in perfecting the ring principle of centrifugal impact crushing and pulverizing. The arrangement of grate bars with 1/16-in. openings produces a cubical stone sand product which has been found to be the most desirable shape. Another outstanding quality of the finished product is the absence of slivers or chips.

Note particularly in the chart how easily stone sand made with a Gruendler Ring Hammer Crusher complies with the U. S. and the Illinois specification requirements.

This type of crusher is ideal for crushing coal for mechanical stokers, for limestone, sand, and as a soft stone eliminator in gravel operation. They are designed to produce a uniform product, operate on a low power consumption and yet serve uninterruptedly for years.

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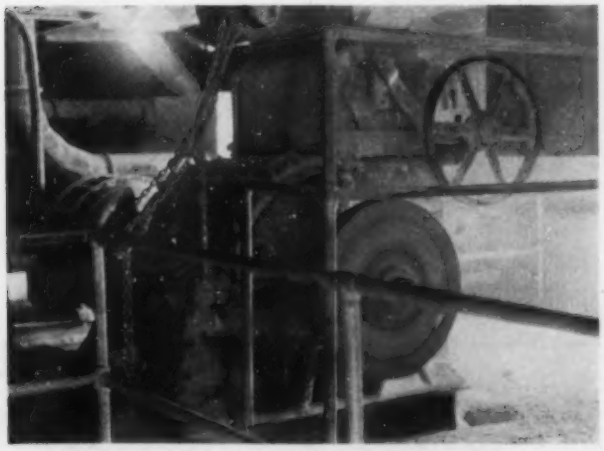

GRUENDLER RING HAMMER CRUSHER WITH FEEDER

Write for Bulletins on Gruendler Rock and Gravel Crushing and Screening Equipment and LIMESTONE Pulverizers.

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Line-up of trucks at Kingston Trap Rock Co., batching plant at Fort Dix, N. J., illustrating severe winter conditions

Sand and Trap Rock Aggregates Blended For Concrete

KINGSTON TRAP ROCK CO., Kingston, N. J., large producer of trap rock, ready-mixed concrete and bituminous mixes, was probably the first producer to be awarded a large contract.

As early as August, 1940, the company began delivery of blacktop materials to Fort Dix for runway construction. Deliveries were made a distance of 30 or 40 miles from the bituminous plant at Kingston in 16-ton White trucks, and the runway was laid by the company as contractor. This job involved about 36,000 tons of washed trap rock from 1½- to 3-in. size, produced according to federal specification SS-A-281 and 6000 tons of fines through ⅜ in. Rehabilitation of railroads within the Raritan arsenal is under way, and the Kingston Trap Rock Co. is now filling this contract of 166,000 tons.

Paving at Fort Dix, N. J., probably will include some concrete in the permanent part of the plant, but about 65,000 cu. yd. of ready-mixed concrete are being furnished by the Kingston Trap Rock Co. for pouring practically all other types of concrete, including piers, foundations and floors for barracks, and other buildings. A concrete batching plant has been located near Fort Dix and 20 truck mixers, mostly of 2-and 4-cu. yd. capacities are operating from this plant which is located at a siding on the Pennsylvania railroad. Batching is done by an Erie Aggremeter plant which has automatic features. Bin capacity is 100 tons of aggregates in two compartments and 125 bbl. for bulk cement. Water is added in the mixing drums at an independent location. Early in December, an oil-furnace and heating coils were being installed to heat the mixing water to 180 to 200 deg. F. at the rate of 1000 g.p.h. Some 20 additional Jaeger transit mixers have been purchased, mounted on White and Ford chassis.

Crushed traprock is shipped to this plant by rail and sand is procurred locally. The sand is deficient in the coarse fractions so pea gravel and grits are added to the aggregates to smooth out the gradation curve. Stockpiles of aggregates are maintained at the plant with a crane in use to fill the batching bins. Grits and pea gravel (No. 8 to ⅜-in.) are introduced by filling one crane dipper from this pile to three buckets of the trap rock in filling the bins.

Proportions are corrected frequently by specific gravity and void determinations made at regular intervals by inspectors at the plant. Moisture determinations are taken of both the coarse and fine aggregates. This plant has delivered as much as 508 cu. yd. of concrete in 9 hr. with a hauling distance of two miles. Much of the pouring is for small sectional area piers which necessarily hold truck mixers for a long time. Lowest

Left: Paver used by Kingston Trap Rock Co., at Raritan Arsenal plant, receiving batched aggregates and emptying concrete into flat bed trucks, saves on transit mixer trucks

Right: Batching unit at Raritan Arsenal plant. Note hired batch trucks receiving aggregates for paving mixer for delivery in flat bed trucks. Bulk cement bin in background

temperatures when pours have been made are 25 deg. F. on a rising curve. No high early strength portland cement is used but calcium chloride is required at temperatures below 40 deg. F. Calcium chloride is added approximately one percent by weight or one pound to a sack of cement, introduced into the mixer drum in a saturated solution. This is added along with the mixing water.

After the drum is charged, including the cement and mixing water, it is operated at agitating speed until the truck arrives at the job. A minimum of 50 revolutions at mixing speed is required and a maximum of 150 before discharging the concrete.

Storage warehouses under construction at the Raritan arsenal, under contracts released to date, will require 18,000 to 20,000 cu. yd. of concrete for floors and foundations, sidewalks, curbing. An unusual combination of central mixing and transit mixing was being utilized at this project in order to conserve on transit mixers. A Johnson aggregates batching bin of 115 tons capacity in two compartments was set up at a location 0.7 mile from the arsenal entrance where trap rock aggregates received from Kingston by rail and natural sand, pea gravel and grits obtained locally are stockpiled. A Northwest crane handles the aggregates into the bin. A separate 125-bbl. bulk cement bin was set up near the aggregates bin. Procedure is to weigh out the aggregates at the batcher, where mixing water is added, and then for the transit mixers to stop for cement. Five transit mixers on Ford and White chassis, all Jaeger, of 2-cu. yd. capacities and up operate in this way with a maximum haul of 2½ miles.

Lower levels of the concrete floors (below the reinforcing) in the warehouses being built are poured with a low-slump "D" concrete (1:3:6) which is furnished, in effect, as central mixed concrete. A crawler-mounted 27-E Koehring paver has been set up to receive aggregates, to mix the concrete and discharge it into flat bed dump (4) trucks of 3-cu. yd. capacity each. Two 3-cu. yd. batch trucks receive weighed aggregates from the regular batching plant and dump into the trough feeding the mixer. These trucks are rented by the hour and those delivering concrete are paid for on the basis of yardage delivered. Calcium chloride is also used in this plant at pouring temperatures below 40 deg. F. This combination of equipment handles 300 cu. yd. of concrete in six hours on the average.

Tractor-Trailers For Aggregates

PENNSYLVANIA SUPPLY CO., Harrisburg, Penn., is furnishing about 40,000 cu. yd. of ready-mixed concrete to W. F. Trimble and Sons Co., construction contractor for the army training camp at Indiantown Gap, Penn., being built at a cost of about $5,413,735. A stationary Blaw-Knox batching plant used before on other pouring jobs was erected inside the military reservation from which the maximum haul in transit mixers is about three miles.

Bin capacity for aggregates is 150 tons in three compartments and for cement there is capacity for 300 bbl. in a Johnson bin. Bulk cement is delivered to the plant from a railroad siding eight miles away, using a bulk cement truck.

Aggregates are sand and gravel produced at the company's Highspire, Penn., plant 30 miles away. Four tractor-trailer trucks, averaging 15 tons to the load, are hauling 24 hr. a day bringing aggregates to the batching plant. Two of these trucks are Mack, one is an International and the fourth is an Autocar Diesel truck. All have Fruehauf dump bodies and one truck was purchased new to increase trucking capacity. At the batching plant, a Lorain 77 Diesel crane transfers aggregates from stockpiles into the batching bins.

This plant is completely equipped for Winter operation and has delivered concrete at temperatures as low as 16 deg. F. Normal operation is on two 9-hr. shifts with a maximum pour of 625 cu. yd. in one day thus far.

Delivery mixing equipment comprises eight 5-cu. yd. T. L. Smith mixers, four 4-cu. yd. Jaeger standard mixers, two 3-cu. yd. Smith mixers and two new 3-cu. yd. Jaeger High Dump mixers. All the trucks are Autocar and International and some have dual drive transmissions.

Heavy traction equipment is an absolute necessity at this job during freezing and thawing conditions since adequate roadways are undeveloped and mud conditions are unusually severe. Weather permitting, the trucks deliver into the forms for barrack piers direct, but under extreme conditions dump into wheelbarrows.

Pumping Concrete to the Job

WARNER CO., Philadelphia, Penn., will start delivery in February, 1941, of 350,000 tons of sand and gravel to the Philadelphia ship-building yard for concrete dry dock construction. Coarse aggregates will conform to Bureau of Yards and Docks specification 13YC for 2-in. material.

Concrete will be a 7-in. slump consistency, with seven sacks of cement per cu. yd., and will be placed by the Pumpcrete system through protected pipelines. Maximum requirements for 24 hr. are 2800 tons of gravel and 1400 tons of concrete sand to be delivered by barge from the producing plant, or for 1000 tons of gravel and 500 tons of sand to be delivered from barges to stockpiles at Philadelphia, or for 750 tons of gravel and 350 tons of sand to be delivered by truck between the hours of 7 a. m. and 5 p. m. Some 60,000 tons of sand and gravel had been stockpiled near the destination by December, 1940. The contract with Dry Dock Associates and its three member companies, will extend through 1941.

Pouring a manhole with 5-cu. yd. mixer operated by Pennsylvania Supply Co., at Indiantown Gap cantonment

Fleet of transit mix trucks used by Harry T. Campbell Sons Co., Towson, Md., to haul concrete up to 20 miles to defense construction jobs

Inspect the Sources of Materials Before Awarding Contracts

Producing plants must be on approved list, and be capable of handling government contracts

SPECIFICATIONS for materials used in construction adhere closely to standard federal specifications. Concrete construction for the Navy is governed by Bureau of Yards and Docks specification No. 13Yc, which conforms in general to the technical requirements of federal specification No. SS-A-281. Deleterious substances in sand are limited to clay lumps not to exceed one percent by weight, a maximum of 0.25 percent coal and lignite and 2 to 3 percent of material finer than the No. 200 sieve. Sand gradation is 95-100 percent passing the No. 4 sieve, 45-80 percent through the No. 16 sieve, 5-30 percent minus the No. 50 sieve and 0-8 through 100 mesh.

Coarse aggregate consists of crushed stone, gravel or other approved materials, with deleterious materials limited to 2 percent by weight of soft fragments, 0.25 percent of clay lumps, one percent of material finer than the No. 200 sieve and 0.25 percent coal and lignite. Crushed stone, when subjected to the abrasion test for stone and to five alternations of the magnesium sulphate soundness test is limited to a maximum wear of 7 percent by weight and an average maximum weighted loss of 15 percent on soundness.

Uncrushed gravel is limited to a maximum wear (same test) of 15 percent by weight and 25 percent is allowed for 100 percent crushed gravel. Average maximum weighted loss on soundness permissible is 15 percent by weight. As is customary in most Navy construction, testing for soundness and resistance to abrasion are not required upon satisfactory evidence that the material has proved satisfactory for a five-year period in concrete which has been under the same conditions of service and exposure.

Army specifications similarly follow standard federal specifications and differ only slightly from those of the other service branch. Neither branch requires any 100-mesh sand but favors a small amount within the tolerance set up, which is 0 to 10 percent for the Army and 0 to 8 for the Navy. Private engineering firms also have the authority to draw up specifications, but operate with the approval of the commanding officer. In general, they follow federal specifications closely.

In discussing specifications and adherence to them, we point out again that speed and economy are the most important factors that govern national defense construction. Both service organizations adhere closely to their specifications when practicable but are making exceptions where it is considered advisable and upon the approval of the commanding quartermaster at each job site. He has the power to make changes in the requirements when advisable to take advantage of local conditions and materials in the interests of the government. Nevertheless, on all types of concrete construction, once having established the requirements, they are adhered to closely by careful inspection and tests conducted according to standard practice. Only in cases, such as the building of a subbase for a blacktop road under extreme requirements for speed, has there been any relaxing of specifications, and in these cases it was imperative.

Source of Material Inspected Prior to Acceptance

Only in rare cases are there likely to be rejections due to soft particles and other conditions in the aggregates themselves, since exhaustive inspection and tests are made at each source of materials prior to acceptance of the source of supply, and of the plant itself. In other words, the producing plants must be on the approved list and in many cases have already had experience in filling government contracts.

As one of the officials of the Navy has expressed it, standard government specifications apply generally; however, in some cases specifications prepared by standard associations and societies, such as A. S. T. M. are used, and in certain cases where it is deemed to the Navy's advantage commercial specifications are used in order to expedite the procurement of materials. He goes on further to state that inspection must be by government inspection agencies regardless of the governing specification

unless delays in delivery occur through inspection, when the manufacturers' certification might be accepted.

In some instances, experience of other governmental agencies on previous work is being used to advantage in specifying materials. For example, government engineers in one locality had had good experience with a trap rock from a certain plant where several stages of reduction had produced a product having fewer elongated particles than other plants. This stone had been found to be more workable in concrete and was required on the present defense construction at an Army airbase.

In this particular instance, the stone was used in ready-mixed concrete with natural sand fine aggregate procured near the site. Pea gravel and grits are required to be added in the batch bins with the stone to fill the gaps in gradation due to a sand low in coarse particles.

As was mentioned previously, the better-equipped plants as a rule have the large contracts, but often at temporary batching plants materials are purchased locally and sometimes from small sand and gravel plants. These plants, in certain instances, have been required to make minor adjustments in classification equipment to increase the output of 50-mesh and 100-mesh particles.

On some of the larger work, involving heavy yardage of concrete, two sizes of coarse aggregates are required which must be stocked separately by approved methods. This is a means of reducing segregation. Producers stockpiling large tonnages of these materials must exercise care in handling to reduce segregation.

Much of the concrete used in cantonments' construction is used for piers and footings to support the barracks. Cross-sectional dimensions run from 6-x6-in., up to 12-x12-in. or 14-x14-in., with reinforcing steel, which requires a coarse aggregate graded from the No. 4 sieve to a top size of ¾-in. This is a smaller size than many plants regularly produce but is an absolute necessity.

Ready-mixed concrete is being used in tremendous quantities, upon approval of the commanding officers at the job site. Here again plants and delivery equipment must be first approved. The plant must be properly equipped, to his satisfaction, for accurate proportioning and proper mixing and delivery of the concrete, and must have accurate means of water measurement and control. Procedure as to the amount of mixing time required varies according to conditions.

New plant of the Boston Sand & Gravel Co., Boston, Mass., which was built primarily to supply materials for defense construction. Special setup of crushers and screen removes material broken down in crushing

On some jobs a minimum mixing time of four minutes is necessary, and on others the number of revolutions at mixing speed are held within a definite range.

Use Several Classifications of Concrete

Proportions and general requirements follow federal specifications but, here again, are varied to meet local conditions. There are several classifications of concrete used, all of which are based on 7-day and 28-day strengths, but having different proportions and aggregates sizes. In cantonment construction specifications, there are written requirements for an A, B and C concrete as follows:

Class A is a 1:2½:5 concrete, with a No. 4 to 1½-in. coarse aggregate, using 7¾ gal. of water to the sack of cement which is designed to develop compressive strengths of 1200 p.s.i. and 2000 p.s.i. in 7 and 28 days, respectively. This concrete is for unreinforced construction. Class B is proportioned 1:2:4, with a No. 4 to ¾-in. coarse aggregate, 6½ gal. to the sack and with 7- and 28-day compressive strengths of 1600 p.s.i. and 2500 p.s.i. respectively. Class C is 1:1½:3, No. 4 to ¾-in. coarse aggregate, 6 gal. to the sack and 2500 p.s.i. and 3750 p.s.i., respectively, at 7 and 28 days.

Class B is the bulk of the concrete used in cantonments. In almost every case the ratio of fine to coarse aggregates are varied, such as 1:2½:3½, to give a better gradation and more workable mix. In no cases is the ratio of cement to total aggregates changed. Frequent void tests and moisture tests on sand and coarse aggregates are taken by inspectors at the plant. Government inspectors are also stationed at aggregates producing plants.

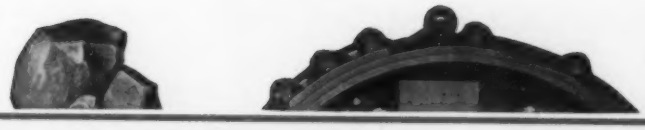
Regulations for winter operations are by no means standard. Here again, it will be remembered that speed is of prime importance and, as a result, pouring operations sometimes continue under weather conditions which specifications normally would forbid.

Most of the ready-mixed concrete plants visited were seen in the early winter months when temperatures fluctuated from 50 deg. F. to well below freezing. One plant had delivered concrete at 12 deg. F., but extra precautions and protection were taken by the contractor on the job. In other cases, no concrete was delivered unless temperatures were as high as 25 deg. F. with a rising curve. Lower temperatures were allowed according to protection available for the fresh concrete and for inside pours.

All the plants, including those temporarily located, were equipped for heating mixing water and some were installing steam equipment for heating aggregates. Engineers are preferring a concrete temperature of 70 deg. F. when placed in the forms.

One plant was using high early strength portland cement and many were adding calcium chloride to the mix. Calcium chloride is required on some contracts when the temperature drops below 40 deg. F. in proportions of about 1 lb. to each sack of cement, applied in the mixers in a saturated solution.

Portland cement comes under federal specification SS-C-191a and is mill inspected and stored in special silos. Masonry cement is produced to federal specification SS-C-181b type II. Hydrated lime is federal specification SS-L-351 type F finishing and SS-Q-351 for quicklime. Gypsum plaster comes under SS-P-401 type V.



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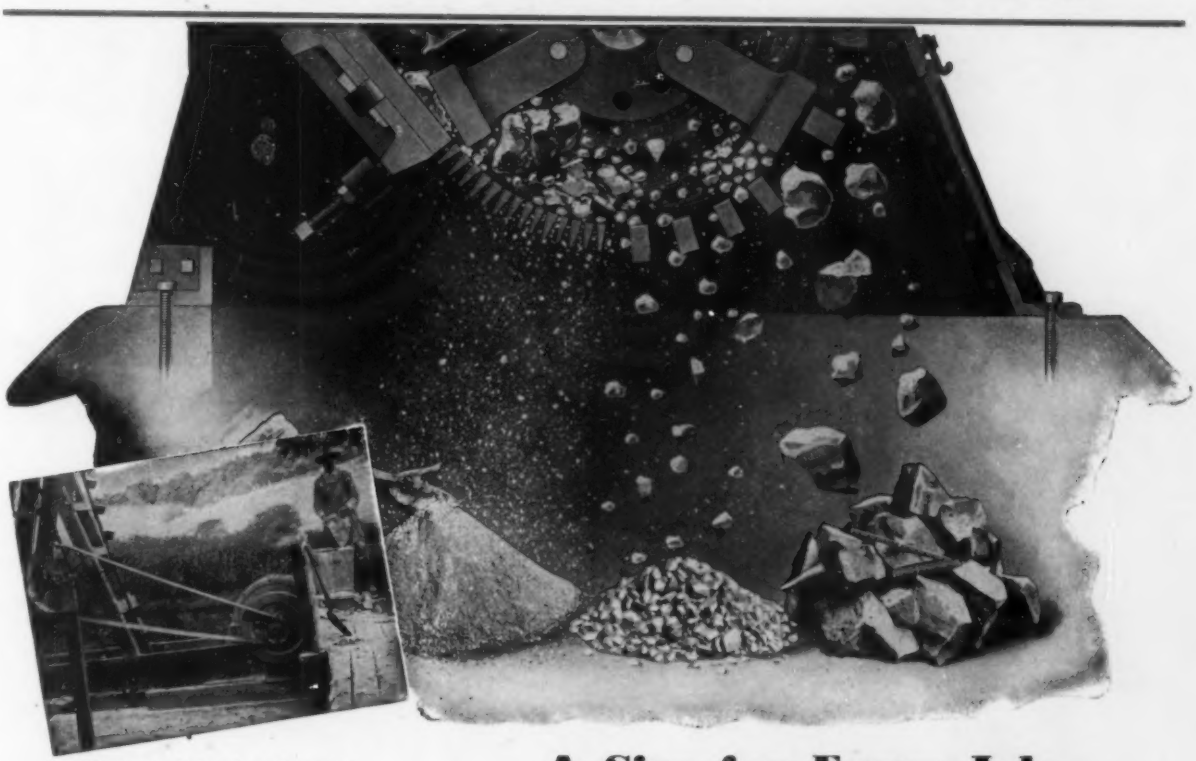

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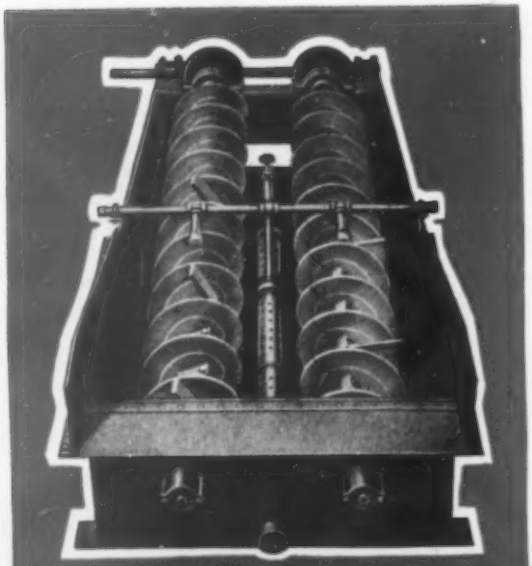

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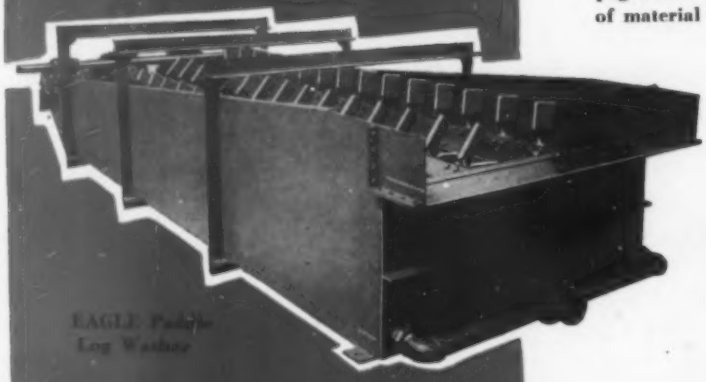

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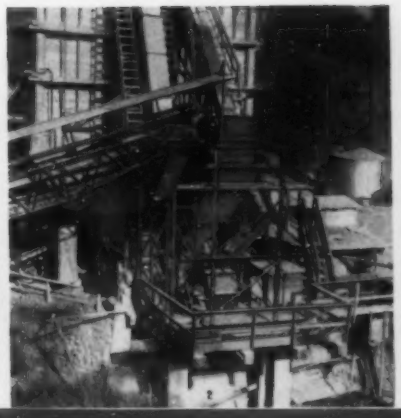

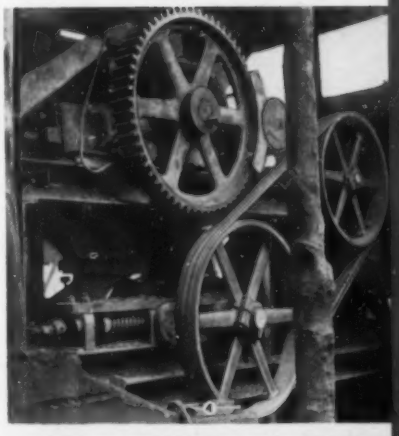

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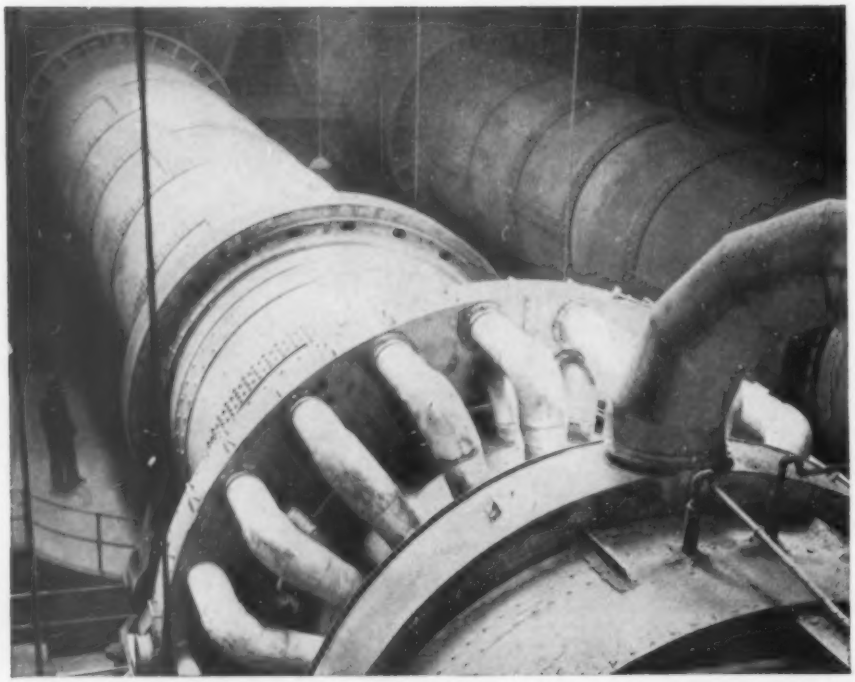

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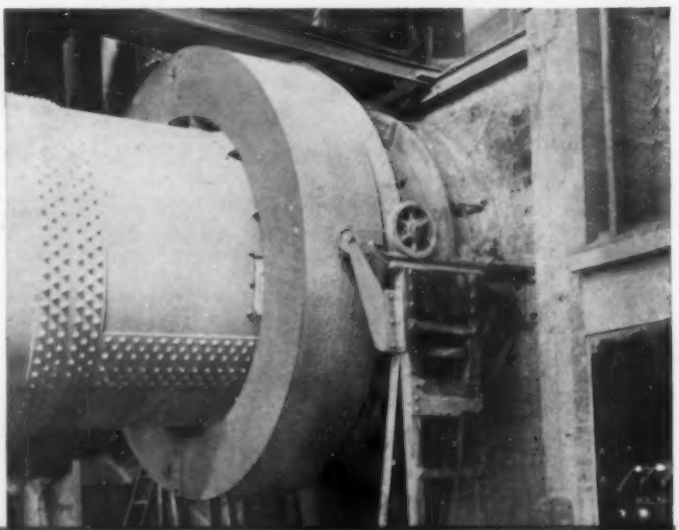

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Reviewing 1940

CEMENT
LIME
GYPSUM

•

AGGREGATES
SILICA
MINERAL WOOL

Better Products Made Cheaper

Developments and trends in cement, lime and gypsum during 1940 point to increases in processing refinements

By NATHAN C. ROCKWOOD

THE YEAR 1940 saw interesting and important developments in the field of cementitious materials—changes in productive capacities, in processing, in products. Even without business caused by national defense construction, all these industries would have shown substantial gains over 1939.

Cement

Estimating from shipments for the first ten months of 1940, the total for the year is in the neighborhood of 132,000,000 bbl., which is about 8 percent more than 1939. The average mill price of the normal portland was about $1.46 per bbl.; of the high early strength cement, about $1.85 per bbl. Shipments were therefore the largest of any year since 1930.

The 132,000,000 bbl. is about half the usually estimated capacity of the industry, but it is probable that the necessity for manufacturing, storing and shipping five or more varieties of portland cement has cut down this estimated annual capacity of around 260,000,000 bbl. It is not unusual in these days to find production temporarily suspended because of lack of storage facilities, not at the end of a shipping season, as formerly, but in the midst of the season. The reason is that the silos are used to store some specially specified cement for a much longer period than there is any legitimate excuse for. Just what effect this has on productive capacity is not known at this writing, but it must be an appreciable factor.

During the year probably at least 6,000,000 bbl. of new capacity was added to the industry, from one large new plant and the practical rebuilding of several more. Also capacity was added in the form of new storage facilities to offset the reduction in capacity caused by the various kinds of cement that had to be manufactured, stored and packed. The problem practically all manufacturers now face is how to handle and ship the various kinds of cement without uneconomic investment in a lot of new packing and handling equipment.

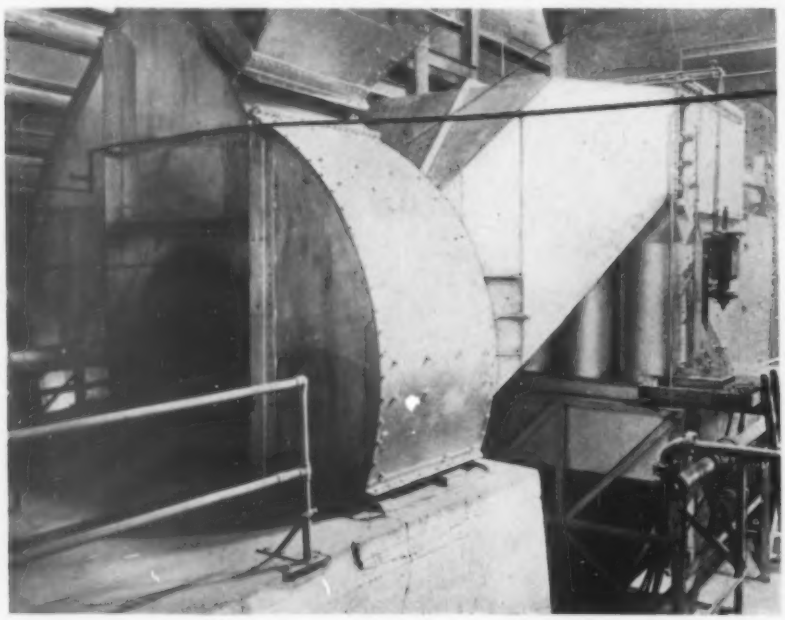
Kinds of Plant Changes

Naturally the direction of plant changes is and will be to make a more satisfactory product more economically. That means refinements all along the line, but more particularly greater precision in proportioning raw materials; better control of the new materials' feeding and burning operation, so that this is closely approaching automatic control, special means to properly condition the clinker (to "freeze" it into chemical or mineralogical combinations, which for the moment at least, are considered to make the most satisfactory cement); all possible ways to conserve heat; close attention to grinding economies; and constant effort to eliminate dust at *every* place in the processing and handling.

Many things have contributed to bring about this constant new investment in existing plants, that until recently were considered quite modern. Foremost, perhaps, are specifications which have put chemical requirements into the proportioning of the raw materials, through limitations on certain assumed chemical combinations in the product. Portland cement processing is no longer merely the grinding, calcining and regrinding of a mixture of calcareous and argillaceous minerals, in which the only concern was the correct percentage of lime. Processing now involves accurate determination and proportioning of lime silica, alumina, iron, the alkalies and magnesia; it sometimes involves separation of these ingredients by flotation or other means, and rejection and reproportioning.

Nor are all the changes and improvements made or contemplated merely in the plant. The new specifications in setting limits on various chemical or mineralogical constituents of cement also require new care and technique in quarrying. Some manufacturers aim to meet these requirements by selective quarrying and some must either buy or produce new raw materials.

To provide chemical control of processing has required installation of batching and proportioning de-



Looking at one end of a battery of 21 small cyclonic dust collectors with the induced draft fan on left, Peerless Cement Co.

vices, most of those so far installed being continuous weighing machines, long known and used by the industry for one purpose or another. Raw grinding practice is being changed in some instances, both to avoid grinding finer than necessary and to grind slurries of different analyses separately. Slurries are being blended today, not merely to obtain the correct lime percentage but the correct silica to alumina plus iron ratio as well.

For ridding slurries of undesired ingredients, the froth flotation process has been carried far beyond the bounds "expert" metallurgists set for it. Separations are being made in 5-10 micron sized particles, which all the text-books say can't be done. Progress is being made in developing new reagents and in mechanical separator devices and dewaterers. Markets are being found for discarded minerals.

New clinker cooler installation at a Lehigh Valley cement plant showing new hoods above clinker coolers and water-cooled burner pipes. One-fourth of air is primary air at room temperature, secondary air is heated to 1000 deg. F., introduced at the rate of 5200 c.f.m., and rest of air through secondary end of cooler is wasted at 200-260 deg. F. On left of hood is aspirator to determine secondary air temperature. Air withdrawn by hand valve passes through thermo-couple for registering on panel

Burning and Cooling Control Devices

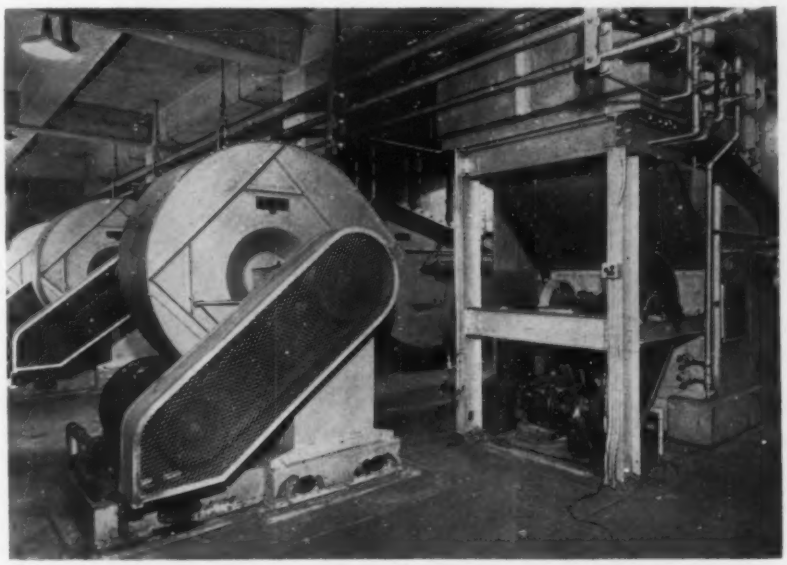
According to R. M. Hardgrove, design engineer, the Babcock & Wilcox Co.: "The burning of cement clinker in a rotary kiln presents a more exacting demand upon the skill of the combustion engineer than do most other uses of fuel. In addition to the problem of obtaining complete combustion of the fuel with a minimum of excess air, there is the additional problem of maintaining a delicate balance of heat transfer throughout the various zones of the kiln."

Mr. Hardgrove might have added that burning of cement clinker is far from being exclusively a problem of the combustion engineer. The cement manufacturer seeks not only to operate his kiln efficiently as a fuel-consuming furnace, but to produce a "well-burned," "hard-burned," or other described clinker which will meet a variety of tests to insure that practically all the lime is combined in some form, even though this form be "glass." To assure certain customers that clinker has received adequate burning, manufacturers have been compelled to install recording pyrometers of the radiation type, such as the "electric eye," of the General Electric Co., which presumably record actual burning temperatures.

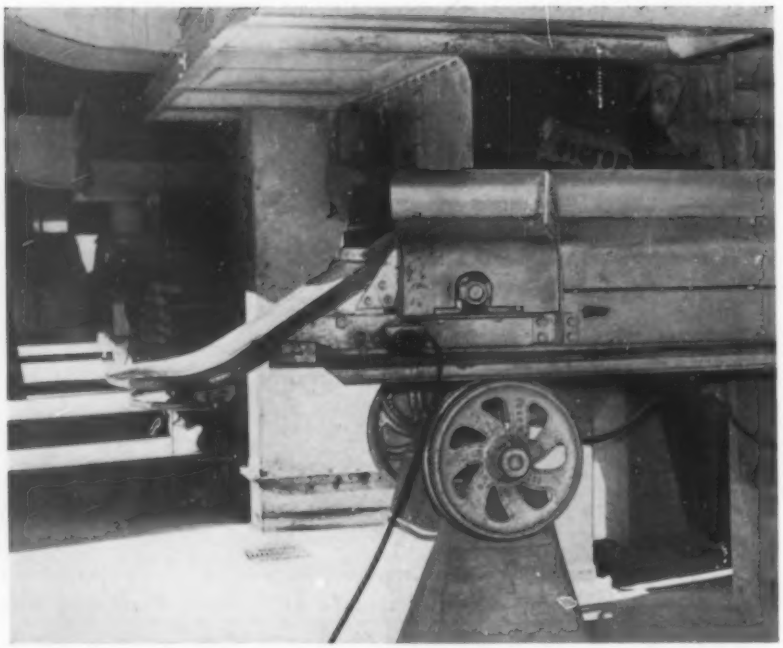
The next step, of course, was to interlock the kiln temperature recording device with kiln producing capacity, as represented by kiln speed and kiln feed. This step has been successfully taken and a number of kilns are so equipped, as has been noted in recent issues of ROCK PRODUCTS. There remains the control of intensity and length of the flame used for firing the kiln, which is still largely a manually controlled operation—with the help of various indicating and recording instruments.

However, recent progress has been made toward automatic control of essential factors in determination of the kiln flame, as illustrated on the following pages, from a new publication by Mr. Hardgrove, from which we have already quoted. Of course, the kiln firing operation can not become entirely automatic because changes take place in the kiln, such as formation of clinker rings, lining failures, etc., which, so far as we can see, can't be allowed for by any automatic device. The progress made does indicate that kiln tenders will be fewer, but more skilled and less dependent on instinct or rule-of-thumb.

To meet specification or control



Clinker cooler installation (same as above) showing fans and grate clinker coolers (3) to save fuel, condition clinker, and improve grindability



One end of movable loading conveyor in packing department of Southwestern Portland Cement Co., Victorville, Calif. Slat conveyor, which is under packing machine, is in background

tests designed to show the absence of free lime or magnesia in harmful amounts, manufacturers have widely adopted devices for quick cooling of clinker, such devices being integral with the kiln, or in the form of grates below the kiln, through which cold air is introduced. Both types have the advantage that air heated by the cooling clinker can be used readily to supply primary and secondary air for the flame. Consequently, their installation is justified on grounds of economy, as well as for what is supposed to be a better clinker. Also, quick and thorough cooling of the clinker helps to eliminate excessive storage of clinker.

Various new attempts have been made to economize on the waste heat at the discharge end of the kiln, especially since it would appear that the era of extremely low fuel prices is over. Waste-heat boilers are again being installed, and one West Coast manufacturer is putting in Lepol preheaters. Other devices for conserving heat at the gas exit end of the kiln were described in the December issue of ROCK PRODUCTS.

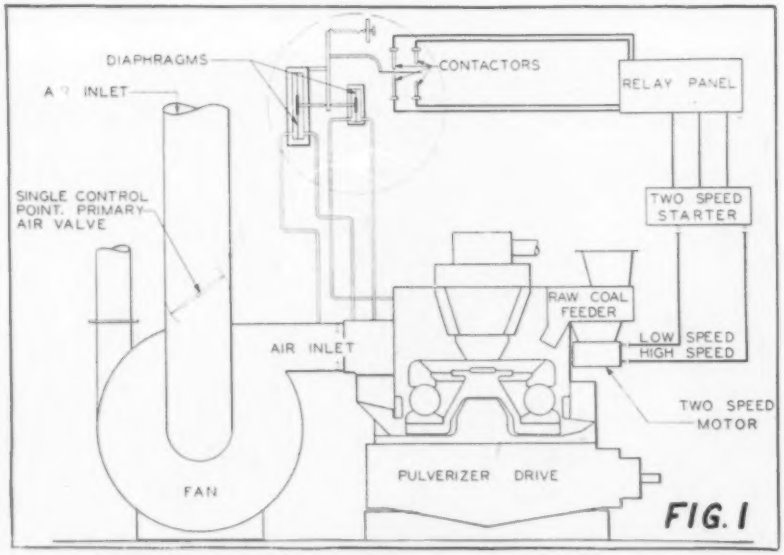
Grinding Economies

Changes in grinding practice are still in the direction of more stages and more use of closed circuits, both raw and finish. There is also some evidence that a few manufacturers are leaning toward grinding raw materials separately, at least in preliminary stages. This was suggested in ROCK PRODUCTS ten years or more ago, since it was obvious that to reduce the most abrasive raw material to required fineness would result in unnecessary fineness (usually) of the limestone. The possibility of separate grinding is enhanced by the present specification requirements which call for slurries of different compositions.

Closed-circuit wet grinding, using electrically vibrated screens to make the separation, is increasing. From experience in closed-circuit grinding of clay slip at the Permanente plant, described in the December issue of ROCK PRODUCTS, the use of 60-mesh wire cloth is practicable in such circuits. This is considerably finer mesh than general practice (see ROCK PRODUCTS, August, 1940, pp. 61, 62).

In clinker grinding it appears that more attention will be paid to particle size distribution, although there is no evidence that users are willing to make any concessions in the matter of less finely ground cement. One manufacturer, at least, is experimenting to determine the efficiency of air separators to produce cement of a required specific surface area rather than to make a separation at some specified sieve or micron size. Air separators, with proper attention to circulating load and other operating features, apparently can give cements of any desired particle size distribution, but the tendency seems to be to operate them so that particle size distribution is far from ideal. It is still debatable whether the final grind should not be always in open circuit.

Manufacturers are giving more attention to a grinding truth long established, that there is no economy or efficiency in making a ball or tube mill do the work of a crusher. Gyratory crushers, usually of the high speed type, ring-roll crushers, or rolls, to break down clinker to ¼-in. or less, before feeding to tube mills are being more and more used. The typical installation has a vibrating screen or screens in closed cir-



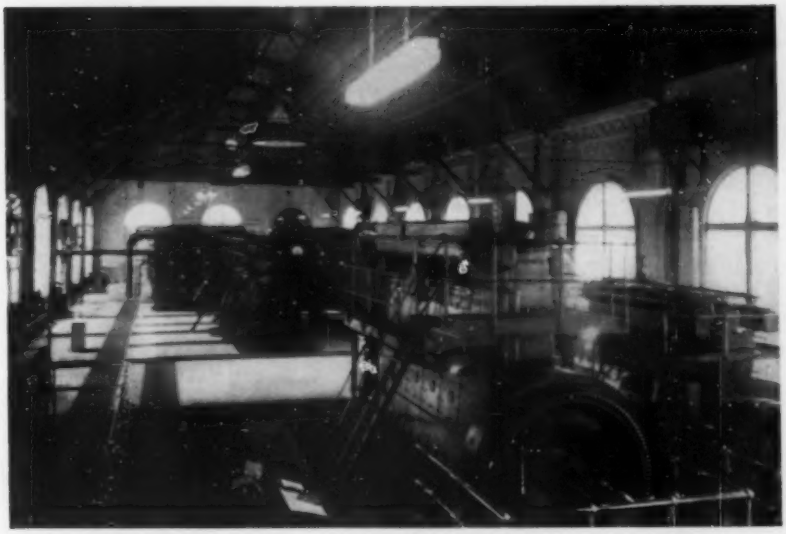
Schematic diagram of coal pulverizer feeder control. The orifice in the clean-air duct to the pulverizer is connected to the large diaphragm and the drop across the pulverizer is connected to the small one. When out of balance, these make electrical contacts to start and stop the feeder motor. Thus for every rate of air flow, there is a definite load in the pulverizer

cuit with the crusher to insure against feeding oversize to the tube mills.

Dust Collection

Progress in dust collection has continued, with particular emphasis on dust elimination in the shipping and packing departments. Practically all the newer installations are equipped with woven-wire belt or slat conveyors for handling the filled bags from the packer to the loading platform. Suction from beneath keeps dust out of the packing room air—and saves cement.

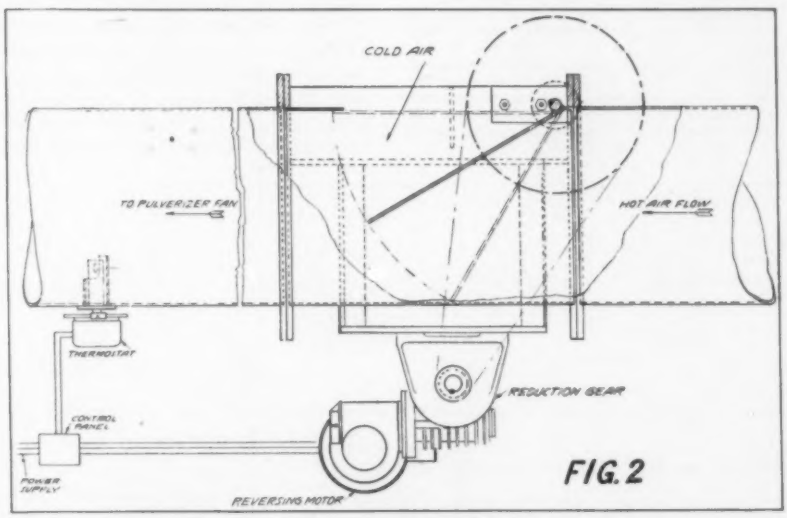
The problem of stack dust collection has still to be faced by some manufacturers. George L. Kirp and R. B. Foley (ROCK PRODUCTS, April, 1940, pp. 41-43) say: "The problem of collecting cement kiln gas dust has been adequately solved by manufacturers of various types of dust collection equipment. The choice of equipment for any particular collection problem usually depends upon a consideration of the important details involved in that problem. Some plants, for certain reasons, require very high collection efficiency; other plants neither require or want extremely high collection efficiency. There is available today a type and design of dust collection equipment to suit the requirements of every plant having a kiln dust problem."



Interior view of the San Antonio Portland Cement Company's power plant, showing six of the seven Diesel engines in this plant comprising 8200 hp.

One problem that is agitating manufacturers now, and is likely to do so even more in the near future, is what to do with the stack dust collected. It used to be considered so much good raw material going to waste, but now it is known that most of the alkalies are recovered in the stack dust, and there is some reason to believe that these alkalies are bad actors in concrete with certain types of aggregates. Some specifications already forbid returning stack dust to the kiln feed, or so limit the alkali content of the cement as to make this feasible.

The most unusual dust collector installation recently made appears to be that at the Permanente plant (ROCK PRODUCTS, December, p. 49) for removing clinker dust from the hot air from the clinker cooler for combustion air. The fuel is natural gas and the dust is removed evidently to prevent abrasion and wear of the burners. This is interesting in view of the fact that dust is sometimes purposely introduced in gas-fired kilns to increase the luminosity of the flame.



Automatically controlled tempering damper for eliminating variations in primary-air temperatures. Constant air flow is obtained by the fixed position of the tempering damper even though the hot-air temperature ahead of it fluctuates

Power Plants

A few cement plants in the Southwest where oil fuel is cheap are installing complete new Diesel-electric generator power plants. Waste-heat boiler installations are again being made, after a lapse of several years during which interest in such power plants seemed to lag. Presumably this new interest in making their own power has been aroused in cement manufacturers by the prospect of power shortages when the defense program gets into full swing, and to the prospect of increased power costs because of increased fuel costs.

Lime—Sintered Dolomite

The lime industry is going through a period of little noticed expansion, which keeps prices at rock bottom, despite a growing demand. The expansion in productive capacity is not spectacular because it consists of adding another rotary kiln, here and there; four new rotary kiln plants, replacing old shaft-kiln plants; finishing a rotary kiln plant that has been in receivership, etc. But when one stops to figure that one rotary kiln with a daily capacity of 100 to 150 tons has as much potential capacity as a battery of 10 old-style shaft kilns, or 50,000 tons a year, one can see that four or five new rotary kilns add appreciably to the capacity of the industry. In 1939 there were but 18 commercial lime companies that produced over 50,000 tons per year, so it can be seen that the 250,000 to 300,000 tons a year of added capacity is further concen-

trating production in the hands of fewer producers.

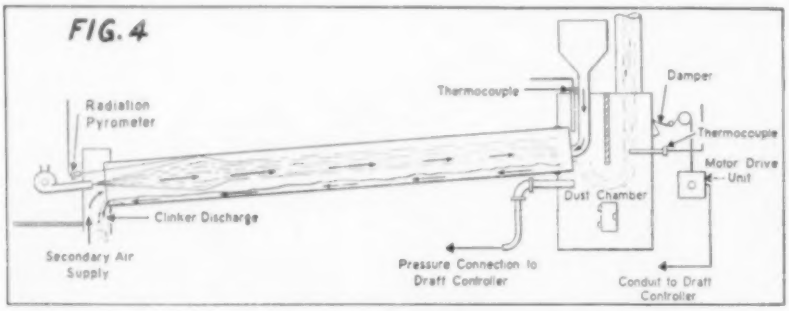
According to recent reports of the National Lime Association, plants are operating now at little more than half their potential capacities, or possibly 2½ to 3 percent above 1939. The total production in 1939 was approximately 4¼ million tons, so that apparently 1940 production will be something like 4½ million tons. A good share of the gain in 1939 production over 1938 was in metallurgical lime and sintered dolomite (which is classed by the U. S. Bureau of Mines as lime) for the steel industry. It is quite possible that the greater activity of the steel industry in 1940 will account for a similar increase, which would raise the total for 1940 to near 5,000,000 tons.

Other than the increase in rotary kiln capacity, the most notable contribution to the nation's plant inventory is the new shaft-kiln plant at Lewisburg, Ohio (ROCK PRODUCTS, November, 1940, p. 45) with which the designer, Victor J. Azbe, expects to prove to American lime manufacturers that modern shaft kilns are equal in economy to, or better than, in every way, modern rotary kilns. A similar plant in Ontario, Canada, has been in operation a year and a half with remarkably low overall costs.

What has been said about waste heat recovery in the cement industry applies equally well to the lime industry. Pre-heaters for raw material fed to rotary lime kilns are more easily designed and installed because they handle pieces of rock instead of slurry or dust. Also, the tendency to build much longer kilns than formerly considered necessary, still holds. Even in the modern shaft kiln, which is designed for fuel economy and low exhaust gas temperatures, excess heat above the calcining zone is utilized for preheating the fuel gases.

Rotary lime kilns, particularly when burning sintered dolomite, seem to be subject to considerable ring formation, especially so, of course, when using pulverized coal for fuel. Methods developed for meeting this problem include more careful selection of coal to avoid excessive ash; finer grinding of the coal to assure more complete combustion and provide for more control of the length and intensity of the flame. Screening out the fines in the feed also helps, as the smallest pieces fuse most readily. Where the same kilns are used for both high calcium and magnesium limes (not sintered dolomite) changing periodically from one to the other is said to help, since the dolomitic stone can be burned at lower temperatures, and the rings already formed have a tendency to break off.

FIG. 4



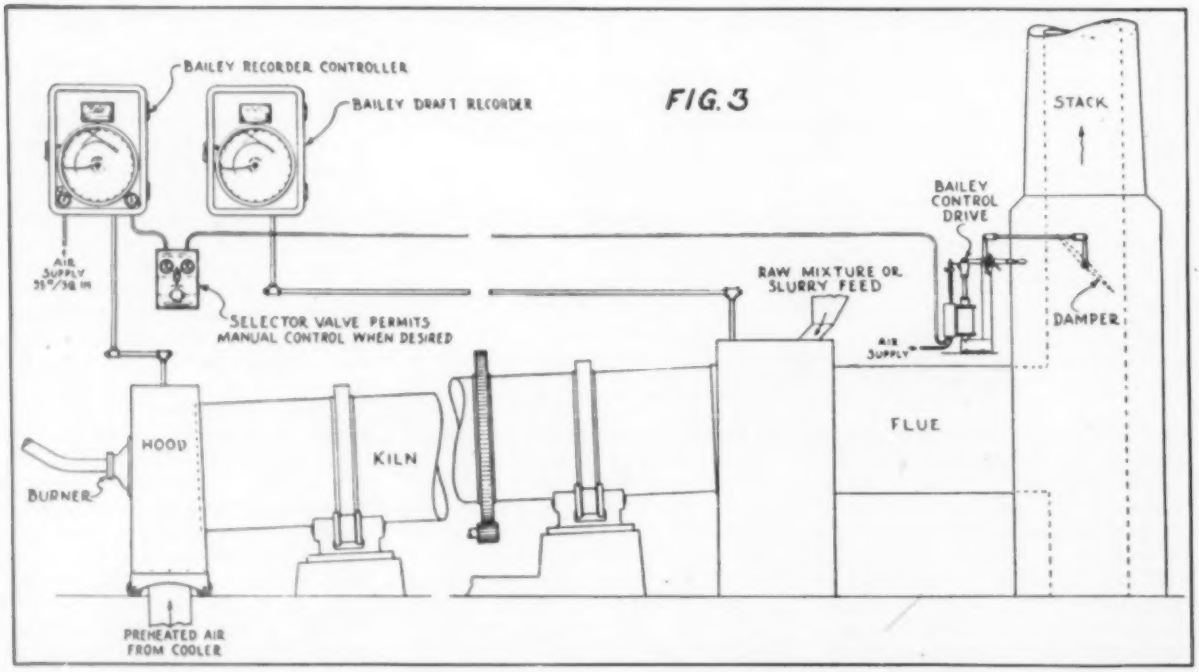
Draft control by draft at the feed end. In the operation of this apparatus clinker rings, excessive coatings or other restrictions to gas flow in the kiln cannot be compensated for, but the operation has proved reliable where these factors are fairly constant

Below: In this system of controlling secondary air to the kiln the draft in the hood at the discharge end of the kiln is taken as an indication of the quantity of secondary air introduced into the kiln. The draft actuates the mechanism opening or closing the necessary dampers for regulating the draft to produce a uniform condition in the hood

The Product

Lime manufacturers are going through a period of self-criticism, out of which will perhaps evolve a real industry research and promotional program. It would be possible and feasible now except for the lack

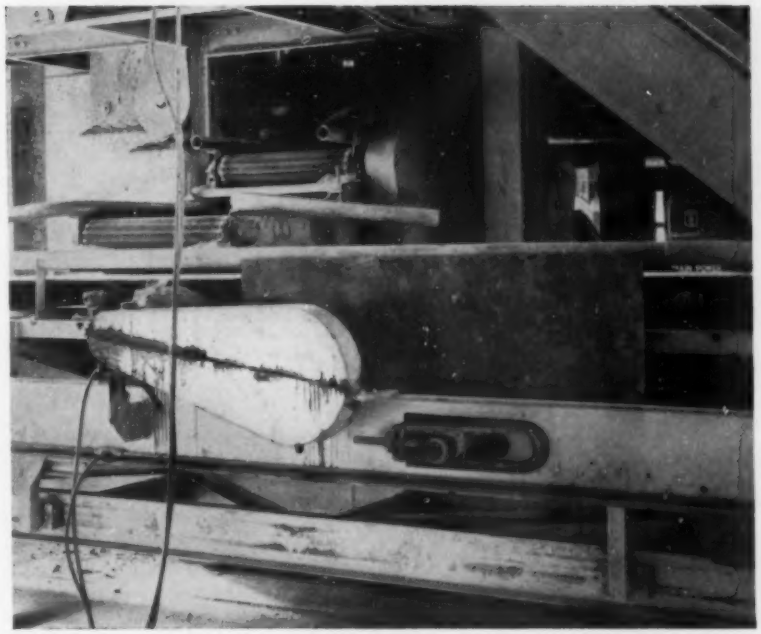
FIG. 3



of coöperation of two or three very large volume producers. A beginning has been made in fundamental research on the properties of lime by X-ray studies at the University of Illinois. A study of specification requirements for lime in a variety of industries discloses that apparently there are only a few basic properties that count: (1) Purity (percentage of CaO or CaO and MgO); (2) Amount and kind of impurities (percentages of SiO_2, Al_2O_3, Fe_2O_3, etc.); (3) Percentage unburned or recarbonated; (4) the settling rate in water, or other liquid used in the process; (5) Reactivity which is probably a function of its settling rate, kind of burn, etc.; (6) Fineness (also conditioned on the settling rate); (7) Soundness (for construction work); (8) Plasticity (for plaster and mortar).

The difficulty in dealing with lime as a standard commodity is that even when these basic properties are made comparable, there is sometimes a vast difference in the reaction of two limes when used in some industrial or chemical process. This is understandable when it is remembered that lime often serves a physical as well as a chemical purpose. Lime manufacturers could get some understanding of these differences if they could absorb the information contained in an American Institute of Mining Engineers' paper by B. B. McHan, technical director, Calcium Carbonate Co., read at the fall meeting of the Industrial Minerals Division (ROCK PRODUCTS, December, pp. 70,71). No matter how finely ground, particles of limestone appear to retain certain characteristics inherent in the original rock, although by patient study and use of knowledge gained, much may be done to standardize qualities most desired. There is no reason to believe that particles of hydrated lime, from different limes, are not just as different in shapes and particle size, as are finely ground particles of limestone. The title of Mr. McHan's paper is "Fundamental Properties of Fine Powders," and it will be published in full by the institute.

The use of lime in the construction industry, for masonry mortars, plaster and admixture with cement



Showing wire conveyors in a packhouse to remove dust from bags, and the shuttle conveyor which permits delivery of bags to either side of building

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Below: Draft control by draft in hood, with metered control of air through the clinker cooler. This method utilizes the differential temperature variation in the exit gases at the kiln exit and at some later point as the actuating impulse for the control apparatus

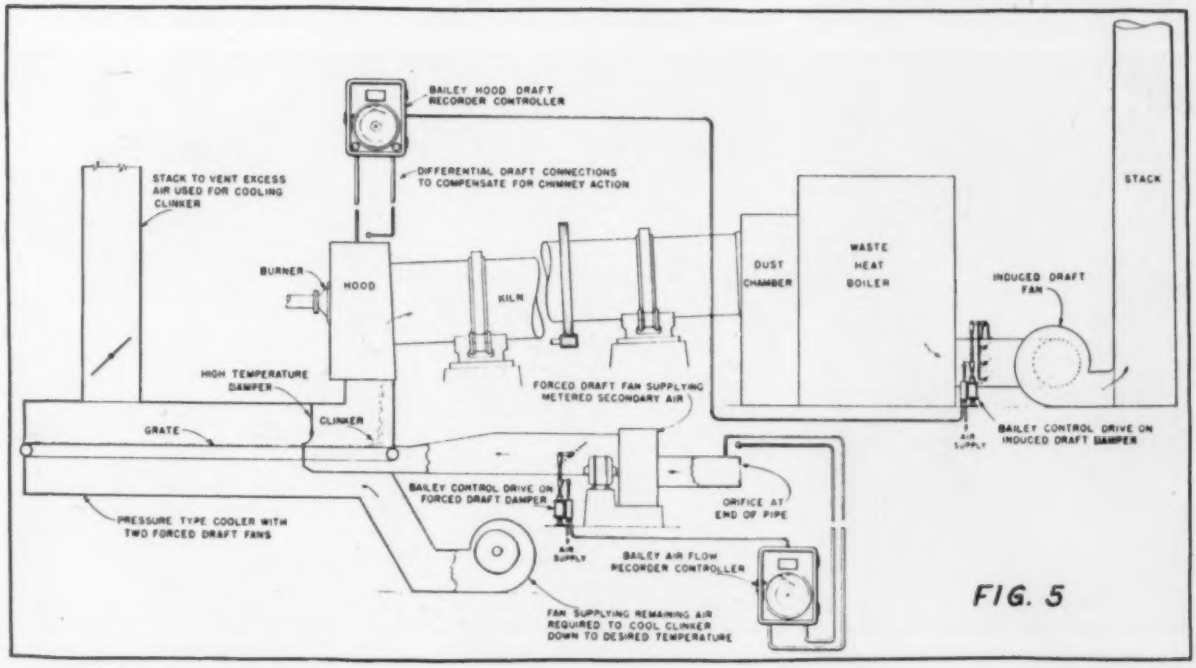

BAILEY HOOD DRAFT RECORDER CONTROLLER
DIFFERENTIAL DRAFT CONNECTIONS TO COMPENSATE FOR CHIMNEY ACTION
STACK TO VENT EXCESS AIR USED FOR COOLING CLINKER
STACK
BURNER
HOOD
KILN
DUST CHAMBER
WASTE HEAT BOILER
INDUCED DRAFT FAN
HIGH TEMPERATURE DAMPER
CLINKER
FORCED DRAFT FAN SUPPLYING METERED SECONDARY AIR
GRATE
AIR SUPPLY
BAILEY CONTROL DRIVE ON INDUCED DRAFT DAMPER
BAILEY CONTROL DRIVE ON FORCED DRAFT DAMPER
ORIFICE AT END OF PIPE
PRESSURE TYPE COOLER WITH TWO FORCED DRAFT FANS
AIR SUPPLY
BAILEY AIR FLOW RECORDER CONTROLLER
FAN SUPPLYING REMAINING AIR REQUIRED TO COOL CLINKER DOWN TO DESIRED TEMPERATURE

FIG. 5

Results of first stage of mixing in the production of gypsum board at new Bronx mill. The next step is further mixing with high speed, centrifugal agitators

in concrete, is complicated by prejudice against hydrated limes containing unhydrated magnesia and comparison of lime mortars with hydraulic cement mortars. That unhydrated magnesia is a cause of masonry mortar failure, has not, so far as we know, been demonstrated, but contemplated U. S. Government specifications limit the magnesia (MgO) to 8 percent. Recent British Government specifications set a 5 percent limit.

This difficulty has apparently arisen from the abuse of hydrated lime on the job. Whereas specifications formerly required soaking the lime putty overnight or longer (many specifications still contain such provisions), it is now common practice to use hydrated lime as though it were portland cement, merely mixing it with sand and water, and using immediately. Since the lime manufacturer can not prevent the abuse of his material on the job, but must meet the objection to it arising from this abuse, he has been busily engaged in research and development work to produce a completely hydrated dolomitic lime hydrate.

This is accomplished by one of two processes, each involving the use of autoclave hydrators. In one process the lime is first hydrated in the regular way and then subjected to steam pressure to complete the hydration of the magnesia; in the other process hydrating is all done at one time by steam pressure. Apparently it is feasible to produce a completely hydrated magnesium lime, but opinions differ as to the advantages of this product as a mortar or plaster material.

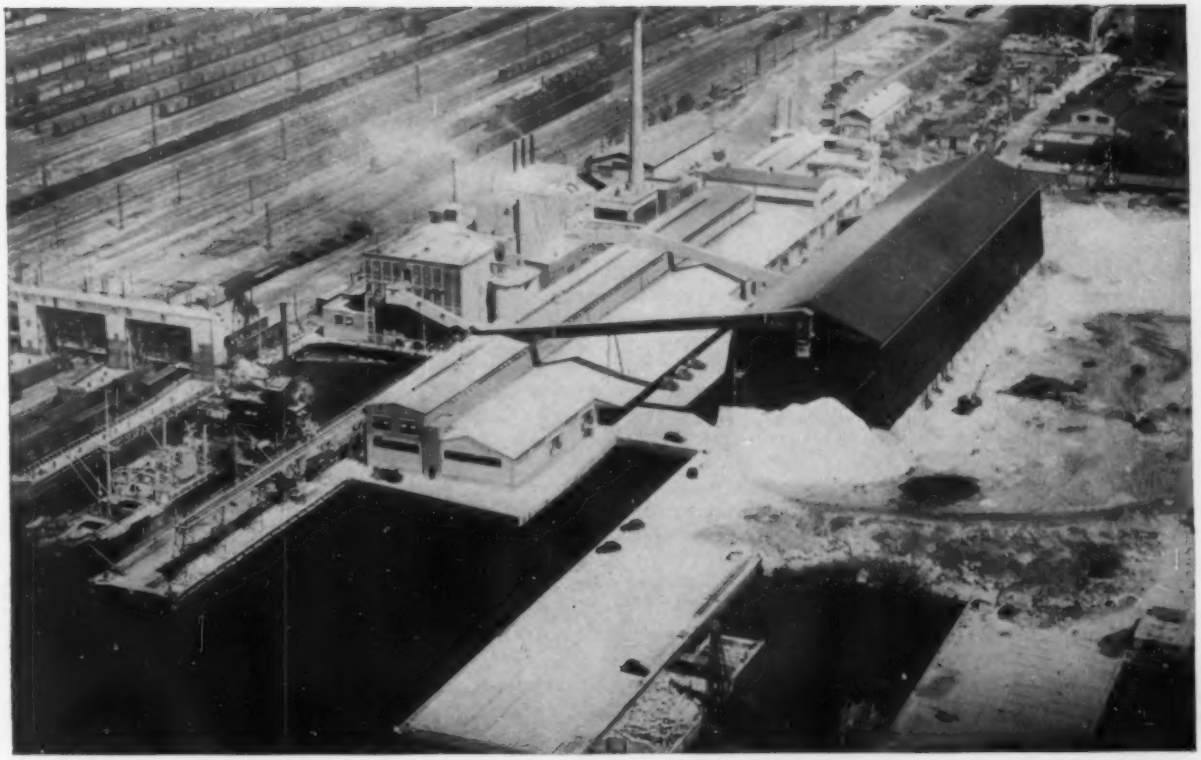
The other handicap to the use of lime in mortar is the evident desire of specification writers to include tests for strength of mortars. As every one knows, lime mortar, not being a hydraulic binding material, has no great strength. Yet because of its bonding properties, lime mortar has definite advantages in other ways. Moreover, lime manufacturers claim lime mortar assemblages (brick walls, for example) have ample strength for the purposes they are designed for. It would appear that the logical answer is a hydraulic lime, which either as a natural or artificial product is within the grasp of every lime manufacturer. Mixtures of lime and portland cement, where the proportion of lime is predominant, are in effect artificial hydraulic limes—which in sales terms means they have the advantages of lime plus at least some of the strength and other advantages of a hydraulic cement.

Gypsum

The chief activity in the gypsum industry in the past year has been the construction of two new plants in the New York metropolitan area, one replacing an old plant which burned. Both plants make wall board as well as partition block and plaster.

In recent years the trend has been to make more use of rotary kilns for calcining, to use larger kilns—around 150 ft. long—with spiral flights and longitudinal vanes to turn over the rock during calcination. To prevent overheating, such kilns are heated by hot gases from a separate furnace or a Dutch oven. It is possible thus to obtain accurate temperature control. There are said to be

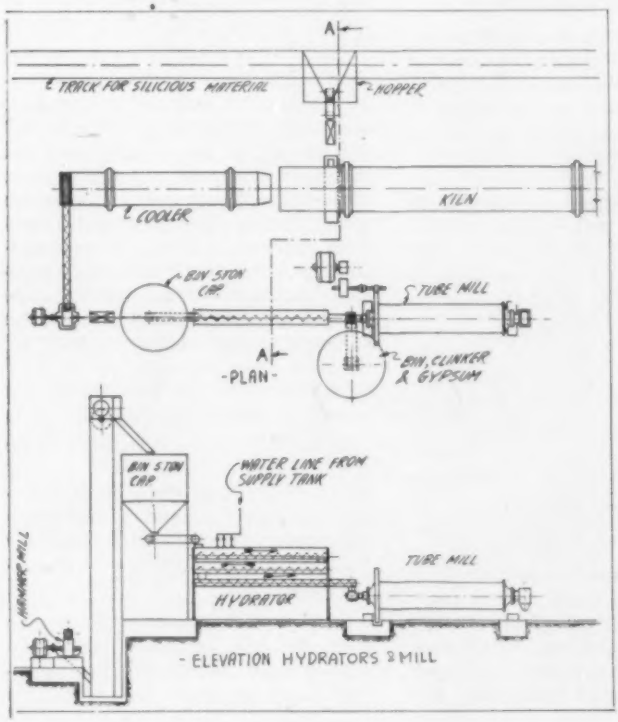
Rotary lime kiln at right was added by progressive manufacturer in 1940—an example of the industry's growth



Aerial view of new National Gypsum Co. plant at the Bronx, N. Y. A ship is unloading gypsum rock in the left foreground; the crushing is done in the structure above the dock; the board mill is in the center; and to the right is the gypsum rock storage shed

16 or 17 such kilns in operation in this country at the present time. However, while the National Gypsum Co. at its new Bronx plant in New York City makes use of a rotary dryer, the actual calcining is still done in kettles, as at the Savannah, Ga., plant, built in 1939.

After several years experimentation one company has perfected a process of calcining and grinding in the same operation, using a Raymond mill heated by hot gases from a separate furnace. The process is said to outstrip others in low cost.



Schematic outline of the patented Blank process for making artificial hydraulic lime

Uses are being found for anhydrite. A recent British patent covers the use of pulverized anhydrite rock as an admixture with calcined gypsum (about 20 percent) which is said to give a product more resistant to high temperatures than ordinary plaster.

The process patented in the United States for converting anhydrite into a hydraulic cement by mixing the pulverized anhydrite with not more than 2 percent by weight of phosphoric acid and sodium phosphate, and not more than 3 percent of silica or silicates, calcined at 1800 to 2300 deg. F. in a tunnel kiln and ground with an accelerator, to control set, is said to be nearing a commercial stage. The product is said to make a plastic mortar with high sand carrying capacity and to have several times the tensile strength of other hydraulic cements.

As a whole, the gypsum industry appears to be entering a year of record production. The entire output of wall board may be needed for army and navy housing construction.

Grinding Aids for Cement

May in some instances lend resistance to freezing and thawing disintegration of concrete—colloidal carbon may make anti-glare pavements

INTEREST in grinding aids, plasticizers, etc., for giving portland cement special properties was growing throughout 1940 and doubtless will continue to grow. P. H. Bates put his stamp of approval on admixtures and catalizers in general in his Marburg lecture at the annual convention of the American Society for Testing Materials (ROCK PRODUCTS, August, 1940, pp. 75-77). He thought there were real possibilities to be developed.

The A.S.T.M.'s new specification for portland cement defines it as "the product obtained by pulverizing clinker consisting essentially of hydraulic calcium silicates, to which no additions have been made subsequent to calcination other than water and/or untreated calcium sulphate, except that not to exceed 1 percent of other materials may be added, provided such materials have been shown not to be harmful by tests acceptable to Committee C-1 on Cement." The burden of proof is therefore on the manufacturer or promoter of the "materials" proposed to be used. So far the A.S.T.M. Committee C-1 on Cement has accepted only one such material (TDA).

This material (TDA) is now quite generally used when manufacturing high early strength cements, or normal portlands (A.S.T.M. types I and II) when these are finely ground, or when difficulty is experienced with coatings on grinding balls. The manufacturers of TDA are now devoting most of their energies to promoting the use of RDA as an aid in dry grinding of raw materials. This is a separate theme, but the claims made for it are worth mentioning here: It is said to increase grindability; to help eliminate dusting and hence cut down excessive stack losses from the kiln; give a more desirable particle size distribution, and thereby make possible an increase in kiln output; air separator efficiency is increased; the dry raw materials flow more readily and hence are blended more readily as well as fed to the kilns more uniformly.

Extensive experiments in New York State both by the New York State Highway Department and the Universal Atlas Cement Co. proved quite conclusively that the addition of "Vinsol Resin," made by the Hercules Powder Co., gave concrete pavements greater resistance to scaling as a result of using sodium chloride or calcium chloride for ice removal. Since the reports of the New York State experiments became well known, several other state highway departments have experimented, or are now experimenting. Fish oil stearate, tallow and other materials give somewhat similar results.

O. L. Moore, director of tests and research, Universal Atlas Cement Co., in the October 10, 1940 issue of *Engineering News-Record* summarized the advantages of using these materials as follows:

"(1) Resistance to salt-scaling of concrete was attained by using cement containing certain very small amounts of fatty or resinous materials. Fineness of cement had little effect. Water-ratio of the concrete also was not the major factor. Laboratory and field tests agreed closely in demonstrating these facts.

"(2) The scale-resisting effect of fatty or resinous material ground in with the cement is due to its action in entraining air during concrete mixing. The entrained air practically eliminates segregation and bleeding of the concrete. This prevents the formation of a layer of weak mortar at the surface. The amount of entrained air and the reduction of weight per cubic foot of concrete is small, but a substantial increase in workability is obtained.

"(3) Some reduction of strength accompanies the entrainment of air, in the same degree as increase of water voids reduces the strength of concrete. Because of the greater workability of the concrete, however, less water may be used for a given workability, and thus the reduction of strength may be counteracted.

"(4) Optimum results are obtained with a definite amount of the fatty or resinous material (0.03 to 0.05 percent for Vinsol Resin with different cements). Larger amounts lessen the beneficial effect and cause the concrete to be sticky and hard to finish with pavement finishing machines.

"(5) The deleterious effect of inferior sand (sand of low resistance to freezing and thawing or to sodium sulphate test) is reduced when cement containing fatty or resinous material is used.

"(6) The scale resistance of certain natural cements heretofore observed is due to the fat or grease found in these natural cements. Although the quantity found in the natural cement was relatively large, its total amount in a 1:6 blend of natural and portland cement was less than half enough to produce maximum scale resistance.

"(7) Portland cement when ground with the optimum amount of scale-preventing additions gave results superior to those obtained with the natural-portland blend, which contained less than the optimum amount of such materials.

"(8) A wood resin product that had been under study as a grinding aid, Vinsol Resin, was found to be the best all-around scale-preventing material.

"(9) Because of this anti-segregating effect, confirmed by the scale resistance shown by concrete of wet consistency, it is probable that the scale-resisting addition will also be of value in preventing manipulation scale. Further, the improved resistance of cores made with cement containing the scale-preventing addition, particularly when inferior sand was used, suggests possible merit also in preventing progressive scale."

Colloidal Carbon as a Grinding Aid

What follows is an abstract of an article by C. W. Sweitzer and A. E. Craig, in the June, 1940, issue of *Industrial and Engineering Chemistry*, describing the results of experiments made at Mellon Institute of Industrial Research.

The research was carried out with four portland cement clinkers described as A, an eastern type reputedly hard grinding; B, an eastern

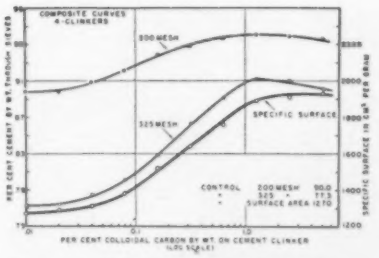


Fig. 1: Effect of colloidal carbon as a grinding aid on cement fineness as shown by specific surface and sieve analysis

type reputedly normal grinding; C, a midwestern type reputedly easy grinding; D, a southern type reputedly hard grinding. The grinding was done in an Abbé laboratory mill No. 9, 18x18 in., 42.8 r.p.m., with a ball charge of 100 lb. of ¾-in. forged steel balls. The clinker charge was 15 lb. and the gypsum slightly less than ½ lb.

Results of Grinding Tests

A summary of results, after 60 minutes of grinding, shows the effect of colloidal carbon on fineness and other properties of the four cements. Various percentages of carbon used in grinding the tested cements ranged from zero graduating up from 0.02 percent, and then doubling the amount in each case up to 5.12 percent, ten tests in all. All four clinkers tested O.K. for soundness.

Clinker (A) showed a steady increase in specific surface from 1170 sq. cm. per gram for zero carbon percentage to 1750 sq. cm. per gram for 1.28 percent carbon grinding aid, tapering off to 1740 for 2.56 and 5.12 percentages of carbon. The sieve analysis through 200 mesh and 325 mesh showed a corresponding condition with an increase from 87.4 percent through 200 mesh for zero carbon to 95.4 percent at 1.28 percent carbon, and 75.4 percent through 325 mesh at zero carbon to 92.3 percent through at 1.28 percent carbon. Normal consistency in c.c. ranged from 24 for zero carbon to 32.5 at 5.12 percent carbon. Water-cement ratio showed little change with 0.61 at zero to 0.65 at 5.12 percent carbon. Both initial and final setting time dropped rather sharply from zero carbon to 1.28 percent carbon and then started to rise again. Initial setting time (hours and minutes) was 4:40 at zero carbon to 2:00 for 1.28 percent carbon, rising to 2:30 at 2.56 percent carbon and 4:20 at 5.12 percent carbon. Final setting started from 6:40 at zero carbon to 4:20 at 1.28 carbon percent and rose to 6:10 at 5.12 percent carbon.

Clinker (B) was ground finer but showed a somewhat similar behavior pattern. Specific surface area started at 1250 sq. cm. per gram for zero carbon and increased to 2040 sq. cm. per gram for 1.28 percent carbon and then decreased to 1900 sq. cm. per gram at 2.56 percent carbon.

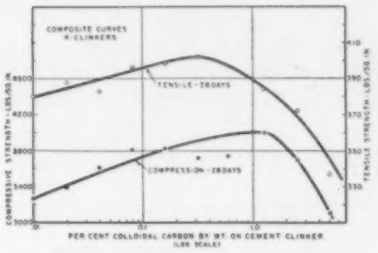


Fig. 2: Tensile and compression strength properties of cements ground with colloidal carbon

However, initial setting time started at 3:00 and dropped to 2:15 at 0.64 percent carbon, rising again to 4:30 at 5.12 percent carbon. Final setting time ranged from 6:00 for zero carbon to 5:30 at 0.32 percent carbon rising to 8:00 at 5.12 percent carbon. Water-cement ratio was less than clinker (A).

Clinker (C) had considerably different characteristics. The specific surface figure increased steadily from 1220 sq. cm. per gram for zero carbon to 2230 sq. cm. per gram for 5.12 percent carbon without the drop at the 1.28 percent carbon noticed in clinkers (A) and (B). Water-cement ratio was the lowest with cement ground from clinker (C), ranging from 0.56 for zero carbon to 0.60 for 5.12 percent carbon. Initial setting time started at 3:30, dropped to 2:50 at 0.64 percent carbon, and then increased to 4:15 at 5.12 percent carbon. Final setting time started at 6:40, dropped to 5:40 at 0.64 percent carbon and then rose to 7:45 at 5.12 percent carbon.

Increases in Fineness with Added Carbon Loading

Clinker (D) started with the highest specific surface, 1430 sq. cm. per gram, and increased to 1900 sq. cm. per gram at 2.56 percent carbon, dropping to 1850 sq. cm. per gram at 5.12 percent carbon.

The sieve analysis and specific surface results for the four clinkers were averaged, and the composite values are plotted in Fig. 1. The sieve analysis graphs demonstrate a gradually increasing fineness for the cements with increasing carbon loadings, to a maximum value which is reached roughly in the neighborhood of a 1 percent carbon dosage. At this carbon loading the specific surface graph reaches essentially plateau values. Based on the discussion of specific surface results, it would seem reasonable to accept the first value on this plateau range (i. e., for 1.28 percent carbon) as a measure of the maximum fineness increase according to specific surface measurements. Taking this figure, rather than the slightly greater values given with the higher carbon dosages, the maximum specific surface increase over control approximates 50 percent.

The cement containing 1.28 percent colloidal carbon is quite dark

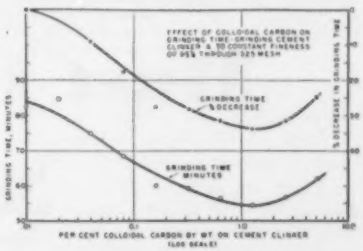


Fig. 3: Showing reduced grinding time when colloidal carbon is used

and for this reason may prove undesirable in general practical use. The cements containing 0.16 and 0.32 percent carbon are not much darkened, however, and yet show striking increases in fineness as indicated by the following values interpolated from the specific surface graph in Fig. 1.

% Carbon	Sp. Surface, Sq. Cm./Gram	% Increase over Control
Control	1270	0
0.16	1510	19
0.32	1640	30
0.64	1780	40
1.28	1890	49

The control specific surface values are lower than those of normal commercial portland cements. These lower values are due to the laboratory grinding technique previously described, which was found satisfactory for the comparative tests of this study although it gave lower fineness results than cements ground by commercial methods.

Strength tests were made according to A.S.T.M. methods on 1:3 mortars, with results as plotted in Fig. 2. Tests were also made of freezing and thawing resistance, and sulphate water resistance, with the conclusion that in these respects the cement was at least as good with the carbon as without it.

Tests of time saved in grinding to the constant fineness of 85 percent through 325-mesh are plotted in Fig. 3.

Unusual storage system in new eastern sand and gravel plant with the equipment designed around storage facilities as a hub. Storage capacity is 100,000 tons within range of a revolving 182-ft. boom clamshell handling into the bin compartments for reclamation to truck-loading plant. Four gravel sizes are produced to help meet grading tolerances by blending

Must Improve On Nature

Industries have to consider soundness, mineral composition, particle shapes and classification of sand for more fines

By BROR NORDBERG

Now that engineers representing purchasers are using microscopes and test tubes to study mineralogical compositions of aggregates, with a view to discovering the reasons for failures of pavements and other structures in service, the producing industries are having to do likewise.

Certain findings that have been made, or the interpretation given to these findings, are threatening the very existence of markets for some producers whose materials had always been considered satisfactory before. Others not so seriously jeopardized are making changes in plants that will help meet these standards. It evidently isn't enough anymore to meet increasingly tough requirements for gradation, with ever growing smaller permissible tolerances on more and more sieves, to produce multiple sizes and to go to added expense to recover or interblend into or manufacture more fines for concrete sand.

Chert Gravels

Chert gravels are under fire by certain highway departments and federal agencies. Concrete pavement defects attributed to bad chert gravels are map cracking, frequent transverse cracks and spalling of the concrete. Studies made to find the causes of excessive and destructive expansion on California jobs have arrived at the conclusion that alkalis in cement reacted with certain cherts to cause the condition. It is recognized that certain cherts have "bad" characteristics and that these cherts are localized in certain areas. On the other hand, many chert gravels have established satisfactory service records for years. Cherts are considered either as good or bad and it is evident that only excessive quantities of the bad variety must be guarded against. However, the Kentucky state highway department has eliminated all cherty gravels taken from river deposits. Tennessee still uses these materials in the western part of the State but the State of Missouri is considering the banning of chert.

There is reason to believe, according to Stanton Walker, director of engineering of the National Sand and Gravel Association, that the degree of saturation of these questionable cherts at the time of use may have a bearing on their effects upon the soundness of concrete. When such materials are dried out in stockpiles, unfavorable results when used in concrete are not nearly as obvious as in the case of unseasoned gravel. When chert gravel has been once dried out, the pieces do not again become fully saturated even in a five month period. Failures are evidently due to particles which are saturated with moisture when put into the concrete. There have been suggested as solutions that protected stockpiling might be practiced; that some way to waterproof gravel might be developed or that better pavement to keep water out of the concrete might help. Chert is defined as an extremely fine-grained silica, chemically the same as quartz but differing from quartz in the size of its crystals.

Particle Shapes

Particle shapes of either crushed stone or crushed gravel are also under consideration by engineers and preference is already being granted in some localities to the producer of materials which have "cubical" shapes. Elongations, flats and slivers are not desired. Presence of an excess of these long pieces is believed by many engineers to make it hard to finish a pavement and that it increases voids. It is believed that some of the long pieces will lie horizontally and break under the rollers in bituminous paving, but on the other hand, other authorities believe these elongated pieces lend rigidity and increase the strength of the surface.

The year 1940 has seen many installations made for the purpose of crushing stone or gravel to cubical shaped fragments and designers of crushing machinery have perfected their equipment along these lines. High speed gyratory crushers which reduce the size of material quickly in stages as it passes through the crusher have been developed and have materially improved the quality

of the finished product. It is generally recognized that high reduction ratios in a single stage of crushing are unfavorable and that the closer the ratio of reduction approaches 1:1 the more cubical the product.

That is the theory behind the modern crushers mentioned, which strike a series of quick blows in a single pass. It has been suggested that in existing large capacity plants, installation of additional crushers between existing ones to reduce the reduction accomplished by each unit would be beneficial. This has been done satisfactorily in several large trap rock plants in New England. At least one manufacturer of screen plate has developed a special device to screen out long particles without excessive loss of good material between the stages of reduction. Army engineers, and now the national defense construction officers, have definitely specified the use of these improved materials in recent contracts.

Satisfactory results have also been obtained with impact-type crushers and several makes of these machines have been developed.

Producers in western Pennsylvania, for example, have invested thousands of dollars in this type of equipment to improve quality by breaking down "soft" particles. Some of the river deposits contain soft pieces of sandstone which are usually the cobbles over 5 in. in size. Selective digging is one practice followed. Impact crushers, when used, serve as reduction crushers. A certain fraction of the stone size in question is put through the crusher to rejoin that fraction by-passed. Sizing over screens is the next step. Highway material in Pennsylvania is subjected to a Los Angeles rattler test with a maximum allowable loss for ½- to 1½-in. gravel of 35 percent in 500 revolutions. Loss by this test has been reduced an average of 5 percent since these plant improvements were made. Experience has shown that passage of all the gravel through the crusher would increase, rather than decrease, the loss by virtue of creating too many sharp edges which would wear off in the abrasion test.

Auxiliary plant consisting of log washer, vibrating screen and bins added to existing plant to produce crushed aggregate for construction of the Pennsylvania Turnpike. Scrubbing equipment was installed to guarantee acceptance and to make available stone that was otherwise inferior

Application of this impact crusher is in the production of concrete sand from gravel at a Pennsylvania sand and gravel plant

Illustrating how a new sand and gravel plant removes the fines produced by crushing in order to meet soundness tests, where disintegrated material exists in the deposit. The conveyor from the crushers on left discharges material on to the vibrating screen on right where fines are screened out. Crushed gravel then returns to the crushing plant over the other belt

Soft stone eliminators of other types, log washers, jigs and revolving drums are also effectively used by other producers in removing unsound particles from gravel or stone. A recent trend, which is just getting under way, is to keep crusher tailings separate from the natural sand. Crusher tailings will contain unsound materials which broke down through crushing "soft" gravel and, when mixed with natural sand, will sometimes increase materially the loss in the sodium sulphate soundness test for sand. Although testing engineers insist that soundness and softness (or hardness or toughness) are different things, they certainly appear to be very closely related. In the case of a Pennsylvania plant, addition of crusher fines to the natural sand increased the sodium sulphate soundness loss to 14 percent when the loss was only 3 percent for the natural sand. Care must therefore be taken in selecting material which it is desired to grind into sand for interblending with natural sand .Several sand and gravel plants built in 1940 have been equipped with an additional scalping screen to separate out all the fines below ¼-in. that are a result of crushing before returning the gravel to the crushing and screening plant. Wet and dry screening are employed for this operation. On the other hand some "ground" sands definitely improve the natural product.

Uses of Impact Crushers

Impact crushers have merit as soft stone eliminators and for the production of cubical stone or gravel but are being used for other special purposes as well. One gravel concern, at least, is producing in one of these machines with a vibrating screen an engine sand from a gravel that is considered far superior to the natural product. Generally, the feed into the

Small, high-speed gyratory crusher designed to produce cubical particles. This one is in a northern sand and gravel plant, crushing excesses of hard concrete gravel into small sizes for bituminous mixes

machine is a ¼- to ½- or ⅞-in. gravel, for which he has little market, and the final product runs 2.5 percent between ⅛-in. and 8-mesh with 80 percent between 8-mesh and 80-mesh. Fines below 80-mesh are not desired, since a coarse granular product flows and dries easier in use.

Another sand and gravel producer, in Pennsylvania, is pulverizing various sizes of hard, siliceous gravel and blending the crushed product with natural sand to produce a sand that looks like a 100 percent natural sand. The bulk of it is crushed. This producer had not excavated any material during 1940, but is re-crushing from stockpiles of gravel and producing sand to almost any gradation with respect to fines that could be desired.

Trends in Sand Production

Production of sand continues in the direction of more fines with some specifications requiring definite percentages of 100-mesh material. It isn't uncommon to require 15 percent minus 50-mesh sand. This tendency in specifications means that more control must be exercised over the sand classification operations, assuming that enough fines to work with are in the deposit, or the interblending of fine sand from another source. Grinding up "shot" to produce needed fines is another development of recent date—provided that "shot" are sound gravel particles.

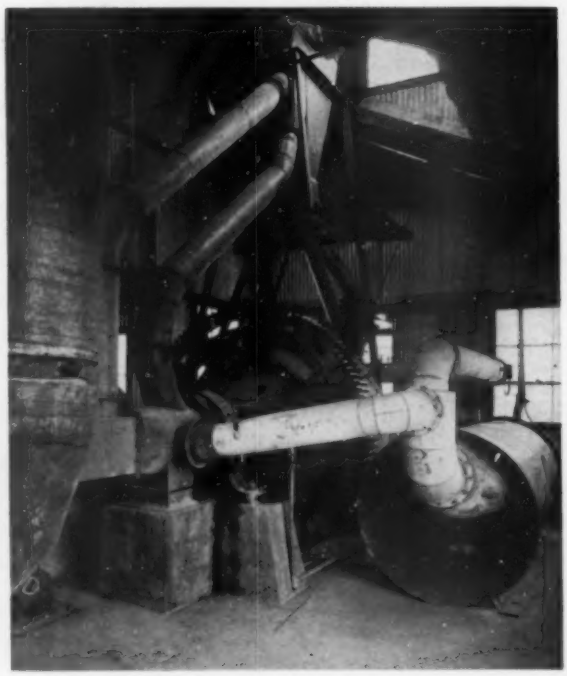
One producer, in rebuilding to recover more fines, has equipped his plant to produce as much as 7 percent minus 100-mesh sand and 4 percent through the 200-mesh. He is probably being fore-sighted in anticipating a further trend in the direction of more fines by government engineers.

There have been several new plants built in 1940 along the lines of the plants producing sand for the Grand Coulee and Boulder Dams, which involves splitting the sand into closely-sized fractions and re-combining in controlled amounts to get the desired fineness modulus. Usually a split is made into three fractions, but during 1940 a plant was built in Ohio to make four splits, the purpose being to arrive at still further flexibility in anticipating the specifications of tomorrow. Division points were at 8-mesh, 20-mesh, 40-mesh, 80-mesh and 200-mesh, with provisions made for accurate blending of the four grades of sand. The new aggregates plant producing aggregates for construction of Shasta dam in California puts minus 3/16-in. material through a slug mill to remove unsound coatings and is feeding some minus ⅜-in. gravel into a rod mill to manufacture sand to replace the approximate 25 percent of unsound sand.

Outstanding among commercial plants designed to meet federal requirements for more fines is the Iron City Sand and Gravel Co. plant in Pittsburgh, Penn., that was described in ROCK PRODUCTS, September, 1940, pp. 24-26. Ohio river sand was lacking in minus 100-mesh sand and weak in minus 50-mesh, but a large U. S. War Department contract called for a sand to have 15-30 percent pass a No. 50 sieve and 3.5 to 8 percent minus the 100 mesh.

Specifications in General

A new plant designed to use a conical ball mill was built to grind some of the normal concrete sand into fines and to blend this fine material back into the other material. The ball mill is in circuit with an air classifier and is operated as an air-swept mill with air heated to 950 deg. F. Output of the mill is three tons an hour of a product averaging 100 percent minus 16-mesh, 92 percent minus 50-mesh, 70 percent minus 100-mesh and 25 percent passing the 200. Blending about 3 percent by weight of this material with ordinary concrete sand produces a finished product coming well within the requirements. It is important that concrete sand to be ground should be of satisfactory characteristics in order to comply with soundness tests.



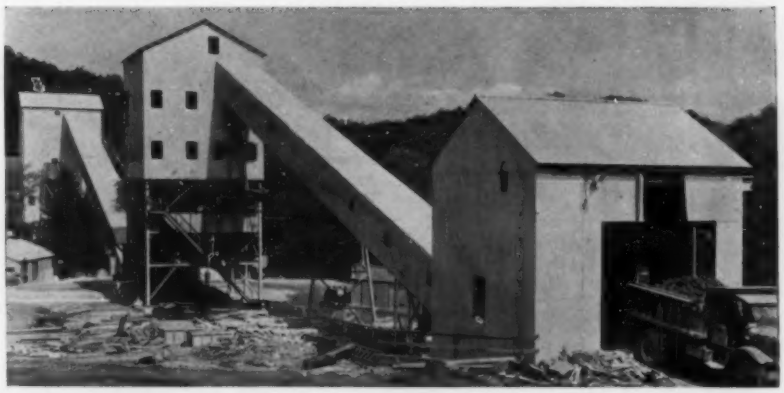
Ball mill closed-circuited with air classifier above to grind natural concrete sand in the production of more fines in a Pittsburgh, Penn., plant. Fines so ground are blended with regular sand to produce a finished product meeting specification requiring extreme fines

Aggregates as now produced are in general of more superior quality than they used to be, and plants are constantly becoming more flexible. It is not unusual to meet 13 to 15 specifications from a single plant, and normal fluctuations in the demand for standard sizes are being met. The trend is toward closer tolerances in sizing and there are difficulties in producing multiple sizes, such as, for example, three sizes from ¼- to 2-in. One plant built in 1940 has increased the number of separations of coarse product into four definite sizes, instead of two or three, as an aid to falling into the tolerances set up. These are ¼- to ½-in., ½- to 1-in., 1- to 1½-in. and 1½- to 2½-in., each of which are sizes that can be sold separately. By stocking in separate bins over a reclaiming belt conveyor, controlled proportions of each are fed out to the belt to produce various blends according to tolerances specified. This plant follows the apparent trend in new producing plants of having a loading out capacity far in excess of producing capacity.

Some of the newer specifications are going toward two sizes of coarse aggregates to be handled separately to the job and there mixed by the contractor. This tendency is a benefit to the producer inasmuch as closer limits in sizes do much to reduce segregation in handling and shipping.

Specifications for aggregates prepared by the Board of Water Supply of the City of New York, which govern material for construction of the Delaware Aqueduct are by no means typical but are mentioned briefly as an example of special standards which producers must sometimes comply with.

Fine aggregate must be natural sand and consist of clean, hard, strong, durable, *insoluble* and uncoated particles. It must contain not more than one percent vegetable matter, must have less than three percent by weight of clay or silt and be free from such quantities of other deleterious substances as will render it unsuitable. All sand must be made clean by thorough washing.



Typical of the modern crushed stone plants equipped for washing is this plant which was built to produce aggregate for construction of New York City's Delaware Aqueduct. It produced over 100,000 cu. yd. of material in 1940 from tunnel excavation rock which is a gneiss. Concrete mixing plant is above tunnel shaft, on left. This plant will be described in a coming issue of ROCK PRODUCTS

It further states that any fine aggregate which breaks down into unacceptably fine material on boiling in water, or 10 percent or more of the dry weight of which is soluble in a 1:1 solution of hydrochloric acid in 15 minutes, should be rejected. Sand must have a gradation in sizes of particles as will produce smoothly working concrete without tendency for the water to drain away. As a rule, sands containing an excess of fine-grain sizes will not be accepted.

It is obvious from these specifications that limestone sands are not allowed and, in fact, highly siliceous material is desired. On gradation, the standards are the reverse of the existing trend for federal work. Very little minus 100-mesh sand is desired, since it is the opinion of the engineers that these fines contain objectionable materials. Minus 50-mesh fines, however, are desired for workability.

Coarse aggregates must be approved gravel or stone and must also be insoluble with little thin, elongated, laminated or soft particle content. Pieces of coarse aggregate, approximately 1-in. cubes, when immersed in 600 c.c. of a 1:1 solution of hydrochloric acid, must show a loss from their original dry weight of not more than 10 percent in 45 minutes. Limestone coarse aggregates are forbidden in this construction where the concrete tunnels are subject to high water pressures—on the theory that the lime will eventually dissolve!

Selective Quarrying

Producers of limestone and dolomite should inventory their quarries in attempts to produce material for particular purposes according to a paper and subsequent discussion on "Resistance of Chicago Area Dolomites to Freezing and Thawing" presented recently by Dr. H. B. Willman, associate geologist, Illinois Geological Survey.

The study proved that there is a great variety of types of stone in any quarry which vary in their resistance to freezing and thawing. Fine grained rock is least resistant while some of the coarse-grained shows remarkable resistance. Discussion developed that where objections were made to the use of dolomite, for sewage treatment, in this case, because of low resistance to freezing and thawing, selective quarrying could have produced a dolomite satisfactorily fulfilling every test. The same process could be followed by producers everywhere, even if run of quarry tests are discouraging.

Overall view of rebuilt plant, showing auxiliary bin in foreground filled with the various sizes produced which are obtained from main plant bins. Turret spout fills any one of four compartments

Concentrating tables in a large mid-western silica plant which are used to separate iron oxide from silica processed for glass manufacture

Find new domestic sources of grinding pebbles to replace foreign importations. Improve washing, tabling, acid treatment methods to eliminate objectionable impurities in glass sand

Sands Vital For Defense

INDUSTRIAL SANDS of all classifications are vital to national defense. The industry considers its capacity sufficient to meet any demands made upon it for the various types of sands. Capacity has been far in excess of demands in the past several years; nevertheless there have been localized increases in productive facilities.

Market trends, both as to purity and grain size, are influencing types of improvements being made in plants producing glass sands. In several instances wash mill capacity has been increased, without overall plant capacity increase in order to more thoroughly wash impurities such as clay, loam and other solubles from the sands.

Requirements for maximum permissible percentages of iron content are stiffening and there have been some developments made to decrease the iron. For some types of glass, iron as Fe_2O_3 must be held down to about 0.025 percent, while as high as 0.3 percent is sometimes permissible.

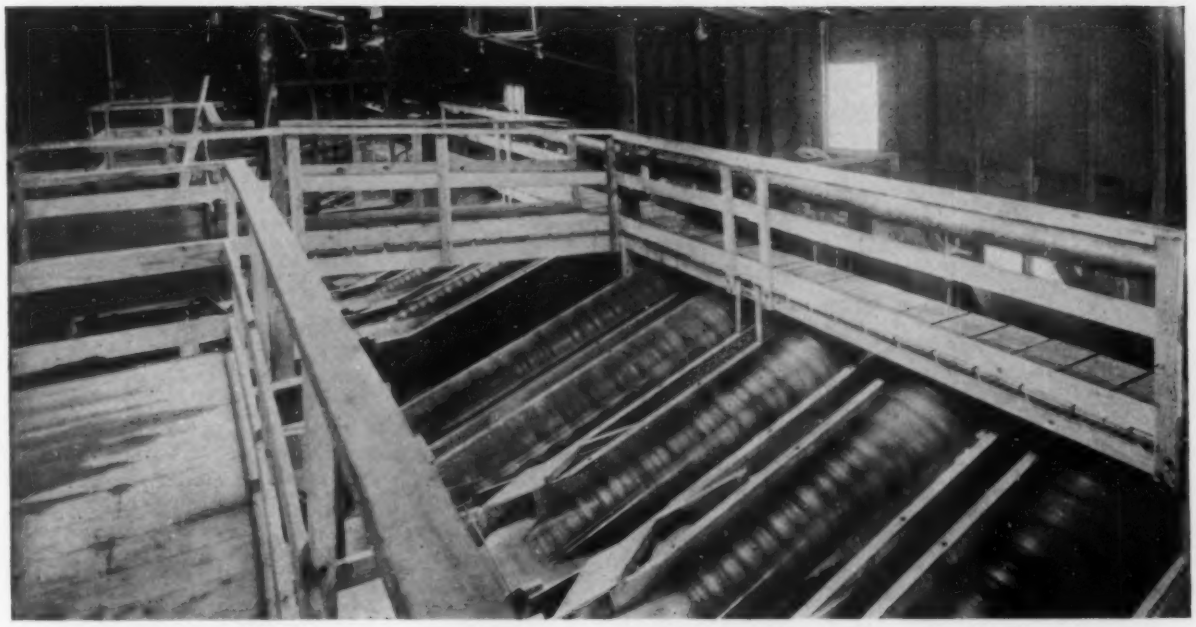
Washing as a means of removing clay, with its iron and alumina content, is most frequently resorted to and the drop in iron content sometimes is sufficient to warrant considerable investment for additional washers. If the iron's occurrence in sands is as magnetite, ilmenite or similar materials which occur in small grains, or if the sand grains are coated with a persistent limonite film, washing will not improve the sand much. However, often in these occurrences, washing is beneficial when supplemented by tabling, acid treatment, or both.

Magnetite and ilmenite, which frequently are a source of iron in glass sand, are magnetic, and therefore likely could be removed by electromagnets. Particles of iron abraded from crushing machinery by the quartz grains could be similarly removed. According to Information Circular 11 published by the Department of Natural Resources, Division of Mines, Mining and Geology, Atlanta, Ga., at least one glass manufacturer uses this method to improve his sand.

In this same bulletin, mention is made of experiments that showed minerals such as magnetite, titanite, ilmenite and leucoxene, all highly ferrugenous, to occur generally in sand as grains which pass an 80-mesh sieve. It is suggested by the authors of the experiments that screening out the grains passing 80-mesh before marketing should be investigated by producers in an attempt to increase the value of their sand. Doing this economically would likely be difficult.

Treatment with acid is being done successfully by several producers of sand used for the better grades of glass manufacture, where iron oxide occurs as a surface coating on individual grains. One producer is dropping the iron content of his sand from 0.05 percent Fe_2O_3 to about 0.01 percent by a combination of washing and scrubbing, tabling and acid treatment in batches. Washing with some dislodgement of the coating and the use of concentrating tables reduces the Fe_2O_3 to 0.025 percent and the rest is removed by acid leaching. This plant uses spiral washers in series to thoroughly wash and handle the sand before subsequent treatment.

Entirely enclosed vibrating screens in a large silica plant in the Middle West. This method of preventing the escape of dust and the use of suction from a dust collector to remove and recover the dust is common practice in the industry today



Series of disc washers operating in a new wash mill to do a thorough job of scrubbing and to dislodge surface coatings of iron oxide prior to subsequent treatment. Silica is put through the washers in succession, to be followed by passage over concentrating tables where dislodged iron oxide is separated out

Grain size is considered equally as important as chemical composition by some glass makers according to the Georgia bulletin. One authority mentioned thinks that in a batch for glass manufacture at least 70 percent of the sand of one grade should be 30 to 55-mesh. Another authority considers that sand should be of medium fineness passing a 20 to 50-mesh screen. Sand uniformly finer than 1/60 in. will "burn out," in his opinion.

The Georgia bulletin lists the following mechanical analyses of typical glass sands from various sources, which afford some good comparisons for different parts of the country:

Operator	Color	Percentages passing 20-M.	40-M.	60-M.	100-M.
Ottawa Silica Co., Ottawa Ill.	White	99	85	18	3
E. J. Reynolds and Co., Utica, Ill.	Grayish yellow	99	45	11	3
Tavern Rock Sand Co., Klondike, Mo.	Faint pinkish yellow	100	82	17	2
Pacific Glass Sand Co., Pacific, Mo. (Direct from quarry)	Faint yellow	100	96	46	2
West Virginia Sand Co., Berkeley Springs, W. Va... (finished product)	Grayish white	100	98	25	1

Preservation of grain sizes in grinding silica rock is being given more consideration in modernized plants through the use of feed control devices. A typical large plant, working a quarry with sand grains of the approximate ideal size for glass making, has put in a sensitive device to automatically regulate the feed into a wet pan, to mention an example. The problem is to grind the rock into its grain sizes without destruction of the individual grains through excessive grinding.

Markets for Waste

The bed in the wet pan is kept 4-in. in thickness with fresh feed coming direct from a storage silo by means of an electro-magnetic vibrating feeder. Over or under feed is reflected in the power load, the amperage variations operate a solenoid and the feed changes quickly and automatically.

Markets are being found for many of the by-products or "waste" material in silica operations. Several producers have recently sold some of the overflow fines from washing to portland cement plants to be used in the cement raw mix. In other instances, these fines have been acceptable for addition to concrete sand to make up a deficiency of fines in that sand on certain paving or construction projects. At least one producer is selling rejects from concentrating tables for the manufacture of mineral wool.

During 1940, capacity for silica flour has been increased not only by the addition of equipment to existing plants but by the addition of at least two new plants—in Georgia and Wisconsin.

Grinding Pebbles

Spread of the war in Europe has cut off imports of flint grinding pebbles and ball mill liners from Denmark, Belgium and France, which have been used for grinding silica flour, feldspar, some of the white portland cements and other non-metallic minerals. Producers of these materials, importers and manufacturers of grinding mills have been trying to find domestic sources of supply with varying success.

Grinding of such materials, in general, requires the use of grinding media and liners that have low iron content to hold down contamination of the product, great toughness and resistance to abrasion. Sizes of pebbles preferred are from 3 to 4 in. in size, which are larger than the majority of natural pebbles discovered thus far. A silica grinding plant will use about 200 to 300 tons of pebbles annually and about half as much in linings.

Returns from a questionnaire by ROCK PRODUCTS have revealed the problem to be acute but one that is being solved. Substitutes from many states and Canada have been tested and some of the producers are running tests on performance in actual production at their plants.

Sources of those natural materials under consideration are widely scattered and characteristics of each differ. Some meet the low iron content requirements, but wear too fast; others have long life but may be used only where slight contamination is unimportant; while other naturally-occurring pebbles run too small in size. Among the types of materials used and under consideration are quartzite; granite; beach pebbles of granite and porphyry; stream pebbles of rhyolite, basalt or granite.

One producer, of feldspar, reported that he had used domestic pebbles for the last eight years with satisfactory results. These pebbles are artificially made from Jasper quartzite deposits in Minnesota and are available as cubes or with the corners rounded off by a ball milling process. According to the experience of several users, these pebbles have little tendency to chip. A similarly-manufactured product is now being made from granite in North Carolina and is marketed under the trade name "Granitex."

Crystal Silica Co., Los Angeles, Calif., is producing a pebble at its plant at Oceanside, Calif., in several grades; 2 to 3 in., 4 in., and 5 in. These pebbles are slightly oval. At least one silica concern is experimenting with the use of porcelain balls which are ideal grinding media but very costly for milling. Similarly, other new grinding pebbles and liners must be considered from the standpoint of cost and freight rates, on the basis of life and cost per ton of finished product.

One manufacturer of ball mill and tube mill equipment suggests as a solution the use of self material, that is the use of lumps of the material being ground. Along this line, it has been suggested that silica flour might be stuck together in balls under pressure with sodium silicate (water glass) as a binder. The opinion has been expressed that this could be done to make a satisfactory pebble for dry grinding. It has been said that a cement binder cannot be used because most chemical operations will not permit lime contamination.

Another equipment concern reports that in some instances its customers have substituted white iron grinding media and that liners of a special composition of hard iron are sometimes used as a substitute for Silex.

U. S. Bureau of Mines has made a study of grinding pebbles and liners and has published the results in Information Circular 7139. The Jasper Stone Co., Sioux City, Iowa, with quartzite deposits near Jasper, Minn., was mentioned as the only commercial producer of pebbles and liners known to the Bureau of Mines for several years. Then, before 1936, a steady output of beach pebbles from the California coast was reported, these pebbles consisting largely of fine-grained tuffs, porphyry and granite. Their use was chiefly in grinding cement.

Various types of selected, well-rounded stream or beach pebbles have been used locally, particularly in the West, according to the report, and angular blocks of basalt rock were used by the U. S. Reclamation Service in its cement mill during the construction of the Arrowrock Dam.

As to possible other domestic sources, the report mentions the pebbles of granite, quartzite and other stone that have been imported from the Canadian shore of Lake Superior and from Conception Bay, Newfoundland, for use in cement mills. Rhyolite and felsite pebbles are abundant along the New England seashore from Marblehead, Mass., to Eastport, Maine. Iron content is objectionable in these pebbles.

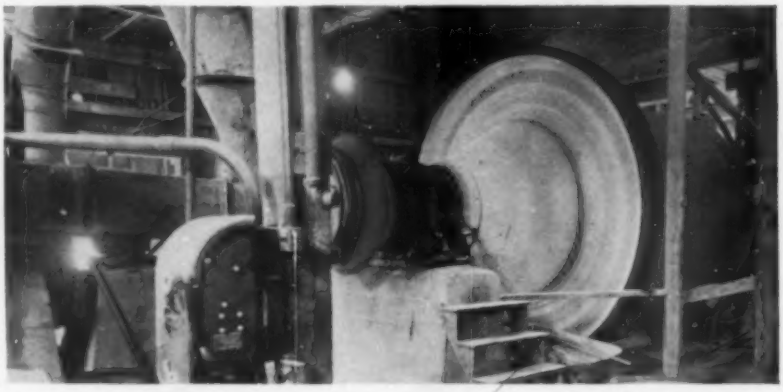
Dealers, importers and suppliers of grinding pebbles and liners who have indicated that they may be able to supply these materials were listed as follows:

Atkins, Kroll & Co., 200 California St., San Francisco, Calif.
King Solomon Gold Mines, Crocker Bldg., San Francisco, Calif.
John C. Momand, Carlsbad, Calif.
E. I. Du Pont de Nemours & Co., Inc., R. & H. Chemicals Dept., Dupont Bldg., Wilmington, Del.
Jasper Stone Co., Sioux City, Iowa.
Clinchfield Sand & Feldspar Corp., Hearst Tower Bldg., Baltimore, Md.
Paul O. Abbe, Inc., 130 Center Ave., Little Falls, N. J.
Eureka Flint & Spar Co., Trenton, N. J.
Abbe Engineering Co., 54 Church St., New York, N. Y.
J. R. Alsing Engineering Co., 50 Church St., New York, N. Y.
Buebendorf Bros., 2 Broadway, New York, N. Y.
John W. Higman Co., 24 State St., New York, N. Y.
New Jersey Pulverizing Co., 205 West 34th St., New York, N. Y.
F. L. Smidth & Co., 225 Broadway, New York, N. Y.
Taintor Trading Co., Inc., 21 State St., New York, N. Y.
B. Voigt, 250 W. 57th St., New York, N. Y.
United Feldspar & Minerals Corp., Minpro Division, Spruce Pine, N. C.
Patterson Foundry & Machine Co., East Liverpool, Ohio.
Philadelphia Steel & Iron Co., Washington Ave., Conshohocken, Penn.
Traylor Engineering & Mfg. Co., 666 South 10th St., Allentown, Penn.
Charles A. Wagner Co., Inc., 811 Callowhill St., Philadelphia, Penn.
J. Howard Swaim, 916 Cotton States Bldg., Nashville, Tenn.
Manitowoc Engineering Works, Manitowoc, Wis.

Lightweight Aggregates

IN THE FIELD of lightweight aggregates, a progress report of the Bureau of Mines tells of work being done on waste slate in the vicinity of Bangor, Penn., which is suitable raw material for the production of lightweight aggregates. Chemical analysis shows this material to contain about 54 percent SiO_2, 17 perecent Al_2O_3 and 7 percent iron oxides, together with appreciable amounts of potassium, calcium and magnesium oxides.

This waste material resulting from quarrying and milling operations fuses at the relatively low temperature of 1150 deg. C. Tests show that the original slate of 2.8 specific gravity will expand more than five times its original volume and still possess a structure of fairly high compressive strength. Expansion on bloating is normal to the cleavage planes, which is a characteristic of similar phyllitic minerals such as mica, pyrophylite and vermiculite.



A type of ball mill in common use in silica plants to grind silica flour. These are the types of mills for which grinding pebbles and liners are sought

Big Increase In Rock Wool Use

Improve manufacturing methods, to eliminate "shot", increase length and reduce diameter of fiber, and the use of binders in bat production

Cutting equipment in a modern rock wool plant which automatically cuts the wool blanket into accurate bat sizes. Steam at the far end of the roller is coming from a similar roller below the blanket, the steam being passed through the roller in the process of sticking paper to the bats

MINERAL WOOLS, which include the rock wools and slag wools, continue to be used for insulation in annually increasing amounts. Building insulation accounts for about 60 percent of the annual market, household ranges and water heaters use 10 percent of the total wool output and household refrigerators take another 10 percent. Industrial ovens, boilers, chemical and refinery vessels, ship structures, acoustics, etc., account for the remaining 20 percent. These figures are quoted from an article by Joseph Stewart and Charles D. Richardson of the General Insulating and Manufacturing Co., Alexandria, Ind., in *Industrial and Engineering Chemistry*. The authors state that the annual sales of mineral wool amount to $16,000,000 and are increasing.

Blowing rock wool into a collecting chamber by the system of double-notching or splitting the molten stream from a cupola, using two steam jets. This practice increases capacity, and is a means of achieving the desired viscosity to blow the mass into fibers of proper length with a reduction in shot

The number of active plants increased in 1940. Several of the newer ones have been built by crushed stone producers to broaden markets for stone. One of the reasons for the widespread increase in plants, aside from increasing and new markets, is that it is no longer considered necessary to have a so-called "ideal" raw material or that a chemical balance be maintained between acid and basic ingredients. Four or even more natural or waste materials are being combined by weight, according to chemical composition, to produce a mineral wool of desired characteristics as to fiber length, fiber diameter, freedom from shot, etc. Each producer has different materials to work with and must do his own research on his particular materials to arrive at best results.

Rock wool plants utilize limestone, dolomite, shale and clay combined with silica or quartz in the form of sandstone or granite rock. However, some of the newer rock wool plants are following the trend toward the use of slags in the mix. Slags are generally cheap and fuse more easily than the other ingredients. The Waukesha Lime and Stone Co.'s new plant at Waukesha, Wis., utilizes a mixture of grey-iron blast furnace slag, limestone, a red granite and even bottle glass when it is available.

Manufacturing Requirements

Common practice is to melt the mix in a vertical, water-jacketed cupola, using alternate layers of the mix and selected high volatile coke, with melting temperatures ranging all the way from 2300 deg. F. to 3400 deg. F. Steam is most widely used, at pressures of 80 to 100 or 110 p.s.i., to fiberize the molten material and blow it into a collecting chamber from which the wool emerges as a blanket on a continuous conveyor to the cutting mechanism. Air is sometimes used instead of steam. Reverberatory-type furnaces fired with fuel oil or natural gas and even an electric furnace, with electrodes immersed in the melting mass, are sometimes used.

Greater attention is being paid by manufacturers to economic operation and better means of producing wool fibers of uniform small diameter, of great enough length and free from shot. According to J. R. Thoenen, U. S. Bureau of Mines, manufacturers try to hold fiber diameter between 4 and 10 microns, which is quite difficult. Long fibered wools are preferable because of the greater strength of the interlaced fibers. The elimination or reduction of shot caused by solidification before the melt has become completely fiberized is a problem which confronts the industry and one not entirely solved. Much work is being done along this line and with some success.

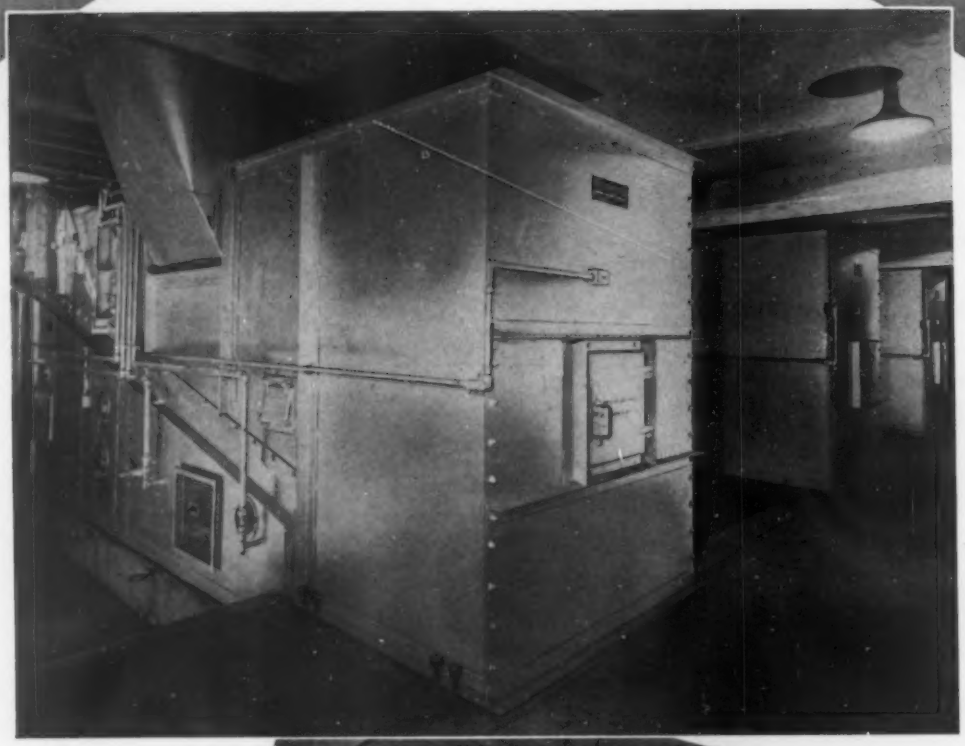
Control Factors

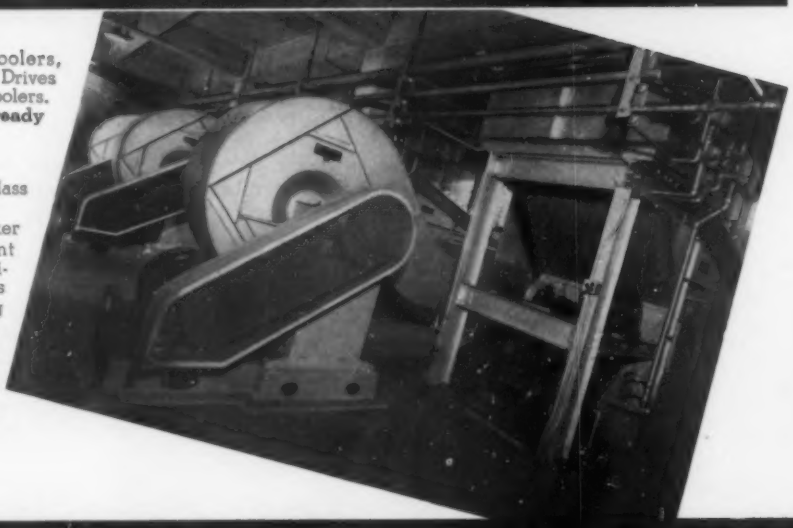
In other words, more attention is being given to the variables which affect quality. Among them are the chemical makeup of the raw mix, the pressure of the fiberizing steam or air, temperature of the molten mass and its uniformity, the viscosity of the melt, size of the molten stream falling in the path of the steam or air and the length of fall.

Uniform size of feed of raw materials is desirable in cupolas in order to get an even draft and regular melt

(Continued on page 106)

FULLER





Three Fuller Air-Quenching Coolers, showing discharge ends. Right: Drives and fans installed on these coolers. **61 of these coolers have already been sold.**

Fuller Cooler Features

Production of clinker of high glass content

Uniformly well burned clinker

Fuel economy, due to excellent recuperation, with high and uniform combustion air temperatures

Mechanical simplicity; requiring comparatively little maintenance

Operation under direct observation.

Grates are water cooled; fixed grates alternate with moving grates

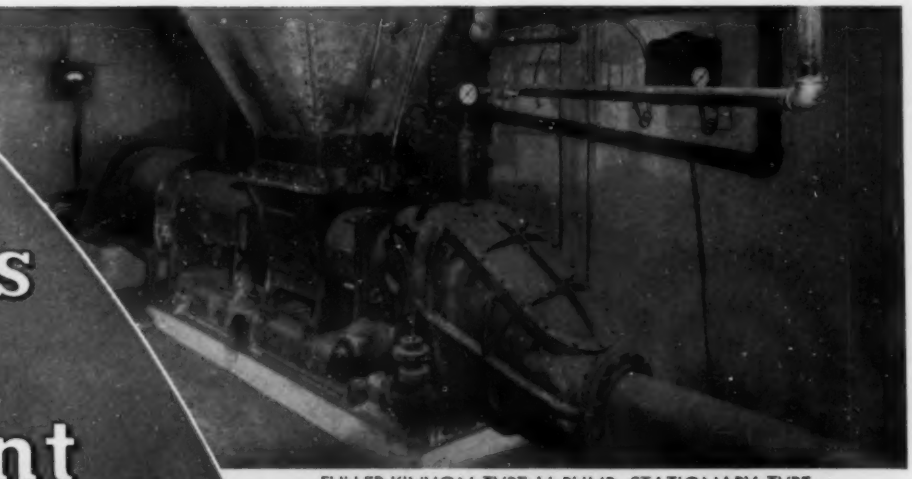
Drive mechanically simple

Lower power requirements.

FULLER COMPANY

CHICAGO—1118 Marquette Bldg.

Serves the Cement Industry



FULLER-KINYON TYPE H PUMP, STATIONARY TYPE

MANY years of contact with the cement industry has resulted in the development of equipment well adapted to that field . . . much of which is today accepted as conventional, such as the following:

FULLER-KINYON CONVEYING SYSTEMS (stationary, movable and portable)

THE AIRVEYOR CONVEYING SYSTEM

FULLER AIR-QUENCHING COOLERS

FULLER ROTARY COMPRESSORS AND VACUUM PUMPS

FULLER-FLUXO CONVEYING SYSTEM

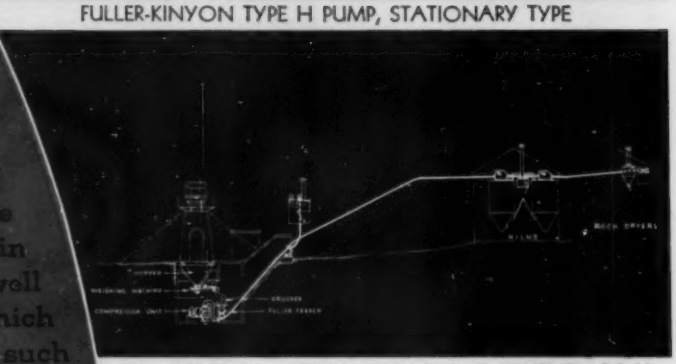
MATERIAL-LEVEL INDICATORS

ROTARY GATE VALVES

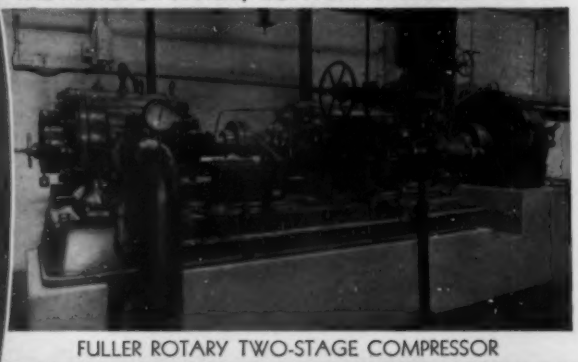
ROTARY FEEDERS

SLURRY VALVES

SAMPLERS



THE AIRVEYOR SYSTEM, CONVEYING CRUSHED COAL



FULLER ROTARY TWO-STAGE COMPRESSOR

FULLER-KINYON REMOTE-CONTROL UNLOADER G-20T

CATASAUQUA, PA.

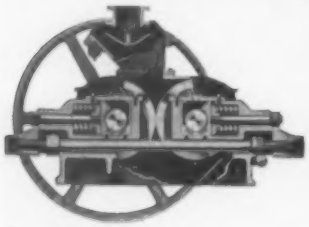
SAN FRANCISCO—320 Chancery Bldg.

STURTEVANT

for

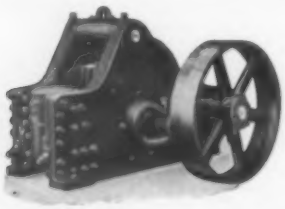
PROFIT PRODUCING EQUIPMENT

Crushing — Grinding
Pulverizing — Elevating
Conveying — Separating
Plus Engineering Service



Crushing Rolls

for granulation, coarse or fine, hard or soft materials. Precision and automatic adjustments. Crushing shocks balanced. For dry or wet reduction. Sizes 8x5 to 38x20. Roller or Plain bearings. The standard for abrasives.



Jaw Crushers

for coarse, intermediate and fine reduction of hard or soft substances. Heavy or light duty. Cam and Roller action. Special crushers for Ferro-alloys. Several types, many sizes.

Moto-Vibro Screens

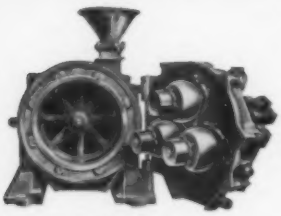
screen anything screenable. Classified vibrations. Unit construction—any capacity. Open door accessibility. Open and closed models with or without feeders. Many types and sizes—range of work 1/2" to 60 mesh.

AIR SEPARATORS

offer proven economy for finest separation of dry materials. Range of work 50-350 mesh. Capacities 1/4 ton to 50 tons per hour. Large feed opening, steep cones, rigid construction. Ball and roller bearings. Small power, low upkeep, easy adjustment. Sizes 3′ to 16′.

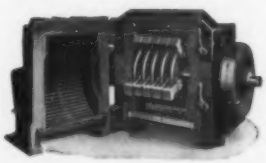
274 AIR SEPARATORS

sold for cement alone. All sold on approval—none rejected. Hundreds used for Limestone, Lime, Hydrate, Gypsum, Clay, Refractories, Talc, Soapstone, Coal, Coke, Phosphate, Abrasives, Etc., Etc.



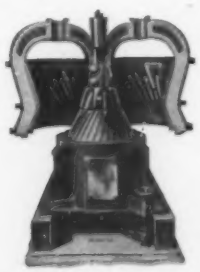
Ring-Roll Mills

for medium and fine reduction (10 to 200 mesh) hard or soft materials. Very durable, small power. Operate in closed circuit with Screen or Air Separator. Open door accessibility. Many sizes, large or small capacities. No scrapers, plows, pushers, or shields.



Swing-Sledge Mills

for coarse and medium reduction. (1" to 20 mesh.) Open door accessibility. Soft, moderately hard, tough or fibrous substances. Built in several types and many sizes.



Rotary Fine Crushers

for intermediate and fine reduction. (1" to 1/4".) Open door accessibility. Soft or moderately hard materials. Efficient granulators. Excellent preliminary Crushers preceding Pulverizers. Many sizes. Belt or Motor driven.

STURTEVANT MILL CO. HARRISON SQUARE **BOSTON, MASS.**

ROCK PRODUCTS

Will Report the Conventions and Expositions of the

NATIONAL SAND and GRAVEL ASSOCIATION

NATIONAL READY MIXED CONCRETE ASSOCIATION

NATIONAL CRUSHED STONE ASSOCIATION

For You in the February Issue

Our entire staff of engineer-editors will be on the job for the duration of these great shows and will present, in concise intelligible form, reports and summaries of the meetings and discussions as well as other activities. Understood, digested and rearranged under proper headings, these reports are of great value as a genuine source of information.

Watch for the February Issue of

ROCK PRODUCTS

BRADLEY PULVERIZERS

FOR CEMENT AND AGRICULTURAL LIMESTONE PLANTS

WE OFFER a complete line of pulverizers for the reduction of **LIMESTONE, CEMENT CLINKER, AGRICULTURAL LIMESTONE** or any Refractory Material where a Finely Ground Finished Product is required.

The JUNIOR HERCULES MILL —specially designed for the **AGRICULTURAL LIMESTONE INDUSTRY** —A large capacity mill that meets every specification of the Federal Agricultural Conservation Committee. A mill to meet your requirements at surprisingly low operating costs.

Designed for Agricultural Limestone
Low Power Consumption
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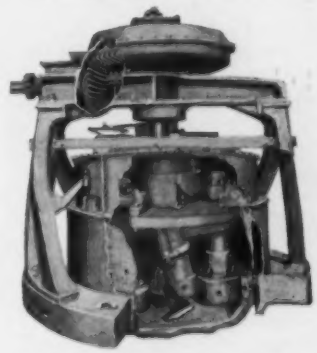

BRADLEY HERCULES MILL

PULVERIZERS and AIR SEPARATORS for most every requirement.

Finenesses: from 20 to 350 Mesh
Capacities: 1 to 50 Tons Per Hr.

BRADLEY PULVERIZER CO.

Works: ALLENTOWN, PA.

FOR EVERY *air-Separating Problem....*

RAYMOND *is the answer*

To meet exact specifications in the classification of powdered materials, it is important to use a separator properly suited to your purpose.

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You can do this by specifying a RAYMOND, specially equipped to suit your needs. Eight commercial sizes are available from 4 ft. to 18 ft. in diameter and two laboratory sizes.

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The *double-whizzer* type is the super-separator of the cement industry. It is capable of classifying to extreme fineness and uniformity in producing various grades from 1800 to 3300 surface areas.

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This machine and also the single *whizzer* separator gives superior results in such applications as the removal of grit in refining clay . . . classifying fine gypsum plaster . . . separating hydrated lime . . . and for producing micron materials up to 99.9% through 400-mesh.

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These separators can be operated independently of, or in closed circuit with a grinding unit.

Ask for Separator Catalog No. 45

RAYMOND
DOUBLE WHIZZER SEPARATOR

With two sets of revolving whizzers. Ideal for producing high early strength cement.

RAYMOND
SINGLE WHIZZER SEPARATOR

For a wide range of classifying operations. Fineness regulated by external adjustment on all Raymond standard separators.

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30-Inch SEPARATOR

For laboratory use or for handling small capacities in commercial applications.

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Laboratory Separator

For classifying small batches, as in running laboratory tests. Also for handling mill grind of a Raymond Laboratory Mill.

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Stepping Up Production With New Equipment

By RALPH S. TORGERSON

NO SMALL MEASURE of the advances made in the rock products industries may be attributed to the new equipment developments of the manufacturers serving these industries. Producers have recognized this fact by working with manufacturers in testing out new machinery under actual operating conditions to iron out the "bugs" that inevitably show up in service.

While it is true that during the past year there have been no startlingly new developments, some very notable improvements have been made in existing types of machinery. The following pages review some of the most important of these developments.

Cement, Lime, Gypsum

In the cement industry there has been a very definite trend toward closer control of kiln operation through synchronization of the raw material feed and the firing. Electrical manufacturers have brought out new motors and drives. A new design of air-cooled nose ring and discharge end section of a rotary kiln has been developed which takes advantage of the natural draft effect of a column of hot air to accomplish ventilation and cooling. Raw material proportioning and blending equipment have been greatly improved. While nothing particularly new has come from manufacturers of dust collectors, the application of the smaller cyclonic types have been increased.

Sand and Gravel

Some noteworthy advances have been made in excavating and haulage equipment. Among sand and gravel plants, the fast, small capacity shovel has found a distinct place for loading trucks and stockpiling. On the other hand, for working in a wet deposit large capacity walking draglines have been purchased. This type also has been purchased by a large crushed stone producer in the East for stripping. For the removal of overburden, manufacturers have brought out some very large capacity haulage units holding up to 12-cu. yd. For selective quarrying of stone, required for the manufacture of lime, white cement, etc., special dump bucket truck equipment has been presented to the field. One of these units, for example, may also be converted to a mobile truck hoist for handling and loading bulky objects. Large capacity truck bodies are coming into increasing use in hauling from mines and quarry to cement mills and crushed stone plants.

Crushed Stone

Crushing and screening equipment changes have consisted mainly in further improvements of existing types of equipment. The impact type of crusher, mentioned in last year's review, has come into wide use throughout the sand and gravel industries and also is to be found in some crushed stone plants for reduction and even for making stone sand. Reduction crushers of both the cone and gyratory type have been improved to give greater capacity and a more cubical product. One manufacturer has announced recently what has been termed a cyclone reduction crusher. The upper end of the vertical shaft, which revolves in antifriction bearings located inside the cone crushing center, is offset so that when it revolves its action is exactly the same as a lever whose fulcrum is the upper frame bearing. This arrangement imparts an outward motion or throw to the cone as the shaft revolves similar to a gyratory crusher.

For pulverizing stone or coal, manufacturers have made improvements in existing equipment and have brought out entirely new apparatus. One of the pulverizers illustrated is designed for fine grinding of stone in a closed-circuit system. The pulverizer provides for discharge of the material by gravity through a central opening in the base and chute leading to the elevator, thereby eliminating the sweep. Another pulverizer, operating on the impact principle, has been used mainly on coal. A feature of the pulverizer design is that wearing parts can be quickly replaced as the housing has removable sections on each side which permit quick replacement of liner sections and rotor plates.

Increasing demand for agricultural limestone has led manufacturers to bring out new designs of greater capacity to operate at a low power cost. One manufacturer has equipped the mill with a new type feeder which regulates the feed and also the fineness of the finished product.

In the lime industry several manufacturers have designed equipment for preheating stone fed to rotary kilns, utilizing wasted stack heat. Improvements have also been made in cooling apparatus. More instrumentation has come into use in the lime industry to make a better calcined product, and for greater fuel economy.

Ready Mixed Concrete

Ready mixed concrete is coming into more general use throughout the country. Manufacturers have met the need for more efficient handling equipment by increasing the mixer drum capacity of transit mix trucks. Quite a number of 5-cu. yd. and even larger capacity mixer truck units have been sold during the past year. The larger capacity unit has been developed for the use of producers having contracts calling for enormous tonnages, such as the defense contracts for airports, cantonments, and munitions plants. To eliminate excessive standing time on the job, portable steel unloading hoppers have been devised to receive concrete from mixer trucks at the job site.

Concrete Products

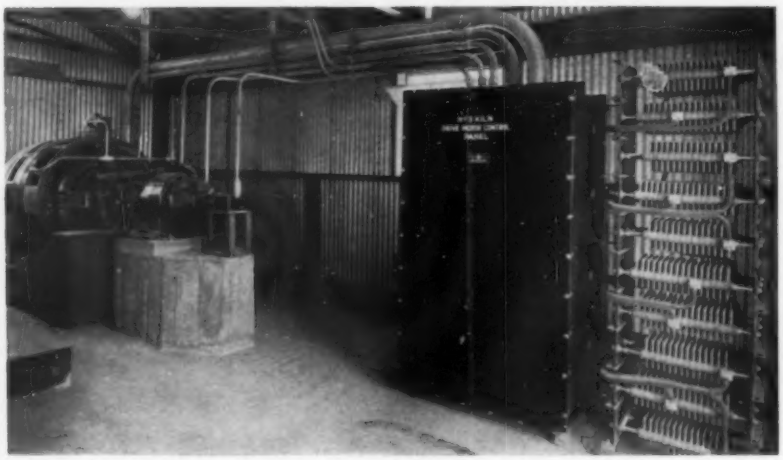
Manufacturers of concrete products machinery have not offered any new developments in equipment, except for refinements to increase production and facilitate handling of block. Both chain and roller conveyors have come into greater use to transport block. A hydraulically operated block machine has been perfected, but no announcement has yet been made as to when it will be produced for the trade. Manufacture of concrete floor slabs or joists has increased rapidly during the past year. The new method of manufacture uses collapsible pneumatic tubes, held securely in position within the forms while the concrete is vibrated into place, to form the cores. Another method utilizes fiber board tubes.

MANUFACTURERS' *Ideas*

Kiln and Mill Drives

● DRUM OF A CRUSHED LIMESTONE dryer being driven by a Westinghouse 50-hp. gearmotor through a silent chain. The gearmotor is mounted on a niche in the foundation supporting the drive, making an extremely compact arrangement. In this case the gearmotor is mounted at a slight angle from horizontal so that its drive shaft is parallel to the dryer drum, which is also mounted on an angle. In one year of service, this gearmotor is reported to have required only one oil change.

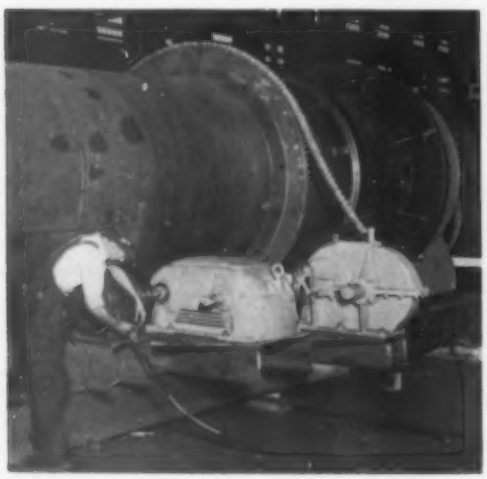
● ROTARY KILN SPEED IS CONtrolled by this Allis-Chalmers Vari-Pitch speed changer unit connected, as shown, between motor and gear reduction unit. Speed of the unit may be controlled either through remote control at the burning platform or by the control mechanism on the speed changer itself. In the range of capacities now being offered are speed ratios as high as 3¾:1 and ratings as high as 75 hp.

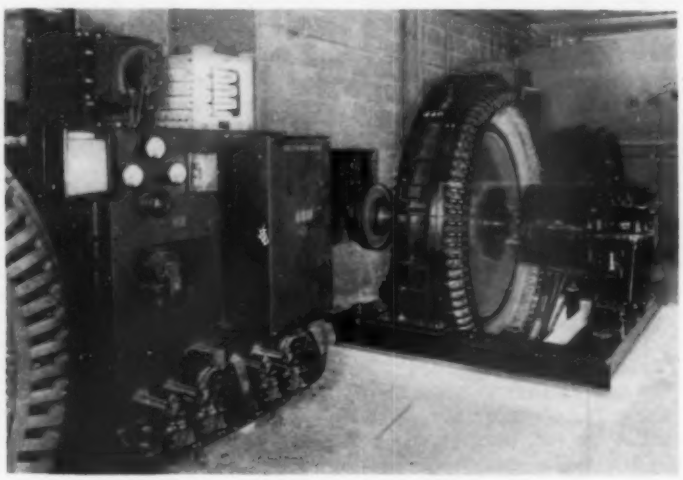


● THE GENERAL ELECTRIC 200-HP. Type BTA 3:1 speed range motor shown at the left drives one of the three kilns at the Permanente cement plant. A solenoid holding brake and tachometer generator are on the motor shaft extension and a G-E dust-tight control panel is at the right. The motor gives adjustable-speed control with little variation due to load changes. It is comparatively new to the cement industry and the largest of its type ever furnished for cement kiln drive. The control system is unique in that preset speed and fully automatic starting are provided. Power is introduced into the motor through collector rings. The rotor also has a large commutator with shifting yokes carrying brushes. By varying brush positions, a smooth change of speed is obtainable between 240 and 720 r.p.m.

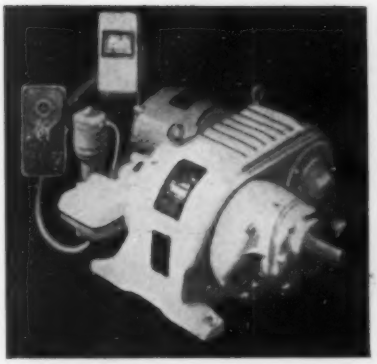
● BELOW: A HIGH RATIO OF STARTing torque to starting current is achieved in this Westinghouse synchronous motor by means of a phase-connected damper winding connected to external resistance which is controlled during starting like a wound-rotor induction motor. Thus suitable accelerating action increases torque in successive steps during starting. The motors drive compartment mills.

● ALL SIZES OF LINK-BELT P.I.V. gear variable speed transmission with vernier control are now available for installations where extremely fine control of speed changes is required. The vernier control can be supplied with ratios of 7½ to 1 or 30 to 1. Rather than vary the kiln speed as a means of control, the amount of pulverized coal fed the kiln is also being accurately regulated. This is being accomplished in some plants by the new Whiting coal mills, which employ P.I.V. variable speed transmission units.



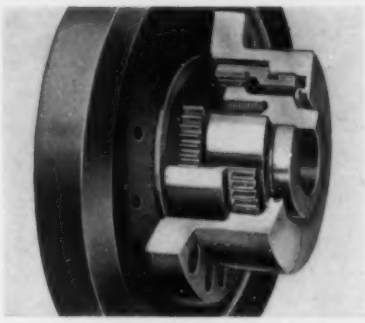


MANUFACTURERS' *Ideas*

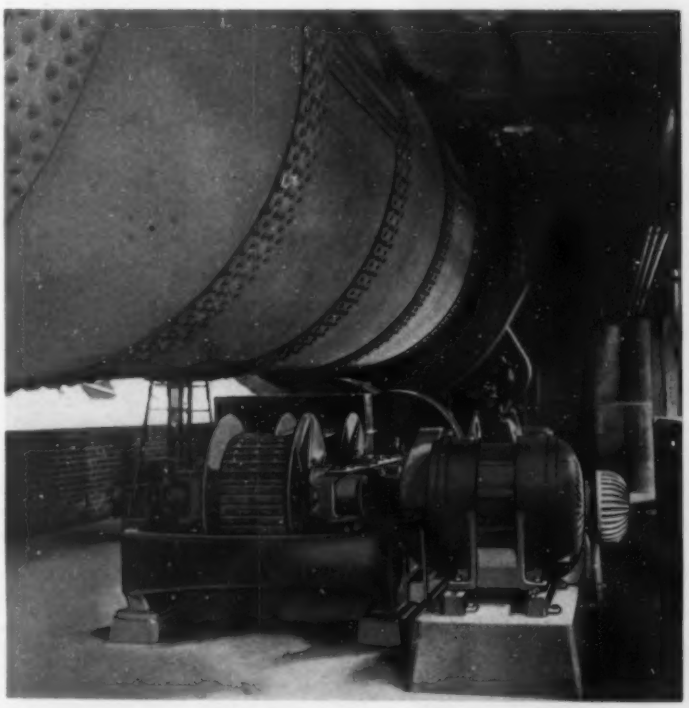


● VARIABLE SPEED DRIVE MOTORS of the Varidrive speed design have been announced by the U. S. Electric Motors, Inc. Motors and gear cases are of strong construction throughout to take care of heavy torsional stresses due to heavy load and low speeds. With double and triple reduction gears, the Varidrive system consists of a small worm gear reducer mounted on the control case and connected to the control shaft. Pilot motor is operated by a thermostat, float switch or similar control through a cyclic relay or process timer. The one controls the direction of speed change while the other governs the rate of change of the speeds. The gears are surface hardened.

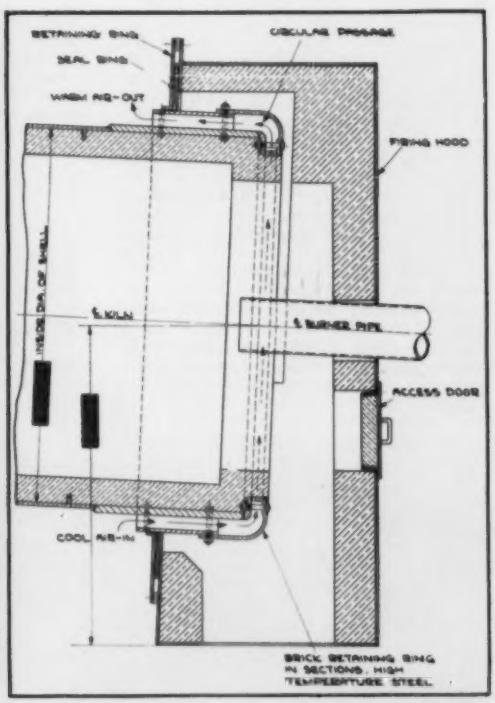
● DUPLEX RECORDER, MADE BY General Electric Co., for use where it is desirable to obtain synchronism between two separate records, or where space economy makes it necessary to place two separate recording mechanisms in a single case. This instrument simultaneously records kilowatts and rkva, kilowatts and frequency, or volts and amperes. Designed originally for cement mills to record kiln speed and temperature simultaneously on a single chart. It may be had with any two of the elements formerly available singly in the type CD instruments.



● TO SAVE SPACE AND AT THE same time secure full flexibility, the Manger flexible coupling has been developed by Farrel-Birmingham Co., Inc. Compensation for misalignment is made by an internal sleeve floating between an externally geared hub and an internally geared covering sleeve.



● ROTARY KILN DRIVEN BY A SLIP-ring type totally enclosed, fan-cooled motor through a Reeves variable speed drive. In the Reeves transmission a V-shaped belt of special design, fits the throat formed by two pairs of adjustable semi-steel, cone-shaped discs, double-key mounted on parallel shafts. One shaft receives power at constant speed. The other transmits power at adjustable speeds. Manual, automatic or remote means of shifting speeds are available. The horizontal design shown is built in 15 sizes, covering horsepower capacities from fractional to 78 and speed ratios from 2:1 to 16:1. The "Speedial," a new type hand-wheel-speed indicator has recently been announced. It very accurately indicates speed settings of the different units. For each full turn of the shifting screw of the drive, the Speedial, with indicator pointer attached, registers one point or degree on a circular scale. Space is available on dial for the user to enter his own calibrations.



● DIAGRAM OF ALLIS-CHALMERS' new design of air-cooled nose ring and discharge end section of a rotary kiln which takes advantage of the natural draft effect of a column of hot air to accomplish ventilation and cooling. This same feature has been incorporated on the feed end of a number of dry process cement kilns and has successfully extended the life of refractories and metal parts. The brick retaining ring is made in sections of high tempered steel.

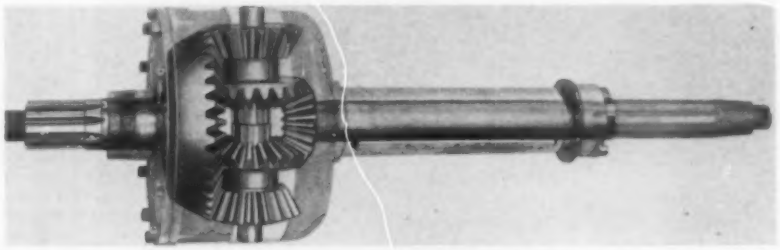
Excavating and Haulage

MANUFACTURERS' Ideas

● COMBINATION SHOVEL, DRAGline, crane and pull shovel recently developed by the Lima Locomotive Works, Inc. Known as the Super-Paymaster, its design embodies the same features of its predecessor, the Paymaster. As a shovel, it is equipped with an 18-ft. boom, 15-ft. dipper handle and ¾-cu. yd. dipper. It is said to be exceptionally fast with ample strength to give steady, dependable service in all kinds of work. Proper balance is particularly stressed. The machinery and power plant is placed to the extreme rear of the rotating frame so that greater capacities can be obtained without affecting the weight of the machine. Hook rollers, rotating between a double roller path cast integral with the lower frame casting, relieve the center pintle of all digging shocks. This unit is typical of the trend in small capacity shovel improvements.

● LATEST ADDITION TO THE LINE of Pioneer Engineering Works, Inc., machinery is its Trukbukit. It has been designed particularly for use of hand labor in loading materials, but also serves a number of other uses. The Trukbukit can reach as low as 30 ft. below the ground line, carries the load high and on top of the truck and dumps high. Buckets are connected, hoisted and dumped easily, and the unit also serves as an efficient handler of bulky and heavy materials. Through the use of the Trukbukit the number of trucks required to transport hand loaded rock from the quarry to the crusher is reduced. Besides serving as a bucket carrier, it can be converted to a mobile truck hoist for handling bulky objects.

● AIR-FEED ROCK DRILL MOUNTING —the Ingersoll-Rand Jackleg—in operation with a Jackhammer. The Jackleg is said to make it possible to use the larger and faster drilling jackhammers on horizontal holes. Instead of the operator holding up the drill by hand and pushing it forward as it drills, the operator uses the Jackleg and only has to exert a slight downward pull on the handle of the jackhammer to balance the lifting force exerted by the Jackleg's pneumatic feed. Drilling footage is said to be increased. Rock drill costs are said to be reduced because there is less wear on the chuck bushings and fronthead parts. The Jackleg weighs 35 lb. and can easily be regulated by a conveniently located pressure throttle.



● PHANTOM VIEW OF NEW POWER proportioning center differential for six wheel drive trucks, recently developed by the Four Wheel Drive Auto Co. The basic principle of this new differential is similar to the common differential that divides power equally. However, the side gears have unequal radii, and differential pinion gears are arranged to meet the unequal sized side gears. The ratio between pinion and side gears operates as a continuous lever in such a manner that the same force applied on the shorter leverage of the differential side gear connected to the front axle reduces the torque applied to that axle, while the same force applied to the rear leverage of the larger side gear connected to the rear bogie increases the torque to the two driving axles of the bogie. In the new FWD differential the gearing is arranged so that a 4 to 1 ratio is obtained. Since the balance is obtained by gearing, it is said to provide a continuous leverage. In other words, no movement between the gears occurs except where differential action occurs such as is the case in rounding corners, going over uneven ground or the like.

● A LOAD OF OVERBURDEN BEING discharged by a LeTourneau V-10 Tournatrailer. In dumping, the load is dropped back of the wheels through an ever-widening opening as the body slides back over the stationary bed. Dumping into grizzlies and tram cars is quickly and easily accomplished by controlling the size of the opening. Since loads are dumped behind the wheels, unloaded material will not impede Tournatrailer travel. Heaped capacity of the unit is 12-cu. yd.

MANUFACTURERS' Ideas

● TWO 12-CU. YD. KOEHRING TRAIL-Dumps working on a stripping job. The new 12-cu. yd. size is an addition to the 8- and 10-cu. yd. models available. With the increased capacity the strength of the body also has been increased and the "Automatic Hand" winding assembly has been improved. Power is furnished by a General Motors 2-cycle Diesel engine, and a 6-cylinder gasoline engine is also available. The turning radius is 11 ft.

● THE NEW OSGOOD TYPE 20, MODEL 200, ½-cu. yd. excavator. It is convertible to any type of service and designed for various types of mountings. Power from either gasoline or Diesel engine is taken directly from the engine to the swing and travel shaft by a triple strand roller chain, fully enclosed and equipped with sight feed lubrication. On the upper deck, there are only two cross shafts; on the lower frame only one. The countershaft has been eliminated. The two horizontal shafts are mounted in roller bearings carried in the side frames.

● THIS FORD V-8 DUMP TRUCK IS available with either an 85- or 95-hp. V-8 engine and with factory installed frame reinforcements and two-speed axle, when intended for exceptionally heavy duty service with special bodies. Two optional hydraulic hoists, one an arm type and the other a direct lift type, are offered on this model. Its wheelbase is 134-in. Improvements in the 85- and 95-hp. V-8 engines include new bolted-on camshaft gears. Valve stems are hardened still further where they fit into guides. The Shifto-guide speedometer is again included as an important aid to economical operation of Ford "regular" and cab-over-engine trucks. It shows drivers when to shift gears in order to obtain maximum pulling ability and economy with minimum engine wear.

● ONE OF THE NEW SERIES OF Brookville locomotives with D-6 International Diesel engine. The locomotives are available in 4- 5- and 6-ton weights with a 4-cylinder, 4-stroke cycle, full Diesel engine, developing 39 hp. at 1500 r.p.m. Its high torque at slow speed is said to give it the lugging ability of a steam engine, and its smooth flow of power is supplied to all four drive wheels through four forward and four reverse speeds. It is available in any gauge.

● ONE OF THE LARGE WHITE trucks powered by Hercules Diesel engines used by Medusa Portland Cement Co., at its Wampum, Penn., plant for haulage from the mines and quarry. The Diesel engines have a rating of 83 hp. when turning at 2500 r.p.m., and a 13 to 15-ton payload carried in each semi-trailer is dumped by a Wood hydraulic hoist. Each carrier is equipped with Bendix Westinghouse air brakes on the trailer and the service tractor.

● AMONG THE USES OF THE NEW Gardner-Denver ABY, 85-cu. ft. portable air compressor is the operation of a 45 lb. block-hole drill where frequent moves are necessary when blasting. Two-stage compression is said to save gasoline and insure operation well below carbonizing temperatures. Compressor cylinders are water-jacketed to maintain an even temperature for proper lubrication in summer or winter. As the compressor cylinders are warmed up during the warm-up run of the engine, damage to compressor cylinder blocks, pistons and rings from cold starting is avoided. An oversize twin disc clutch permits easy cranking.

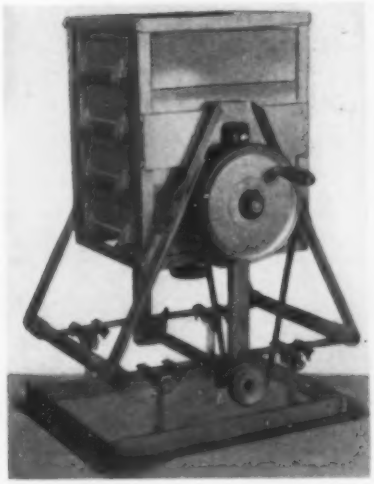
● ABOVE: FAST, SELECTIVE LOADing is accomplished with this Model 300 LF Dempster-Dumpster. The bucket being carried away to the crusher is a 3-cu. yd. drop-bottom type and those being loaded are the tilt-top type. The body is mounted on a Mack truck with 117-in. wheelbase.

MANUFACTURERS' Ideas

Crushing and Screening

● LARGER, TYPE "R" GYRATORY crusher introduced by Allis-Chalmers Manufacturing Co. This is known as their No. 636 Type "R" and has resulted from the wide acceptance of the No. 322 Type "R". It has a 6-in. wide feed opening and a 36-in. diameter crushing head. Like the smaller size, it operates at higher speed than other crushers of the gyratory type. Its crushing stroke is selected for a high capacity, cubically shaped product and is suitable for handling large tonnages. The spider and top shell are cast integral and readily removable for replacing its one-piece manganese steel concave ring and head mantle. It has the Type "R" oil-filled, hydraulic jack for adjusting the liner and mantle and also the safety feature which permits automatic relief for tramp iron. The crusher is driven by high speed cut steel gears in a bath of oil. Oil is cooled in an external cooling tank. Counter shaft is driven by flat-belt or Texrope drive from the motor or engine, as the case may be, and dust seals keep the working parts of the crusher clean, helping to reduce wear.

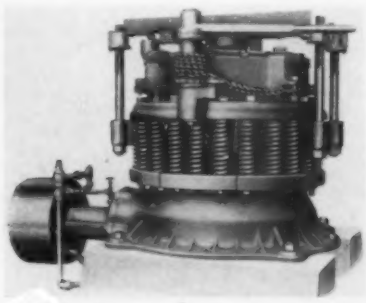
● ABSOLUTE DUST PROTECTION IS said to be provided with this new, totally enclosed Type "C" Leahy No-Blind vibrating screen made by the Deister Concentrator Co. All sheet metal dust-proof enclosing assemblies are heavily flanged and precisely fitted for a perfect seal through cemented-on felt dust-proofing strips. The lids are fastened by means of new, quick acting fasteners which assure dust-tight protection.



● TO MEET THE DEMAND FOR A testing screen small enough to handle test samples of sand advantageously and still large enough to take a No. 20 gravel or stone sample, the Gilson Screen Co. has just developed this testing screen. It is intended for use where considerable testing volume must be quickly handled at a low investment outlay. Trays are not removable from the retaining frame, but screened material is discharged by rotating the entire unit to a horizontal position and opening the drop doors desired. Screen cloth is inserted from the front, between tray flanges, and is retained in place by operating a tightener.

● THIS IOWA "KUBIT" IMPACT breaker is doing a good job for the G. G. Hill Co. at Dexter, Mo., in producing stone to meet ballast specifications. The Hill company found it possible to speed up operations by speeding up the impact crusher and opening the primary crusher about 2 in. The "Kubit" is designed to produce a cube-shaped product from any type stone available. Breaking is done entirely by impact and no crushing or grinding action is employed. It is claimed that this principle of crushing causes the stone to split along its natural grain and thereby reduce the amount of splinters and sharp edge rock produced.

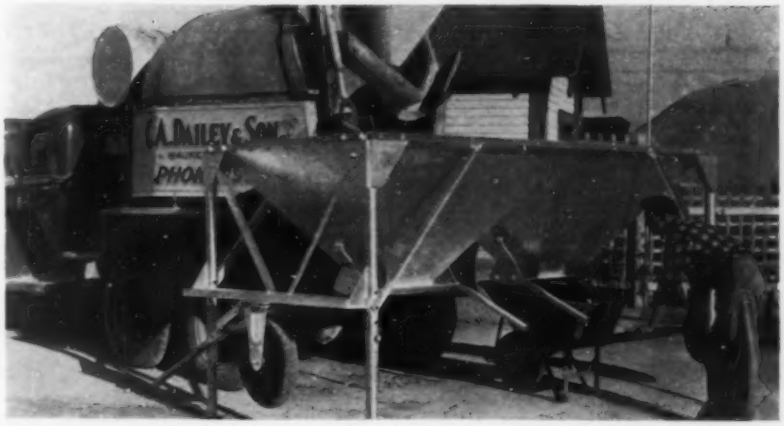
● NEW TYPE CONE CRUSHER DEveloped by Universal Road Machinery Co. Known as the Reliance cyclone reduction crusher, its operating principle is said to be extremely simple. The upper end of the vertical shaft revolves in anti-friction bearings located inside the cone crushing center, this portion of the shaft being offset so that when it revolves its action is exactly the same as a lever whose fulcrum is the upper frame bearing. It imparts an outward motion or throw to the cone as the shaft revolves. This eccentric motion or throw is small; and as it is fitted with anti-friction bearings, it can be operated at a high speed and deliver a large output without using excessive power. No yoke or upper bearing is required. The top receiving opening is 4½- or 5½-in., the bottom discharge is ½- to 2¼-in. and capacity is 15 to 40 tons per hr. Drive is through heat-treated and hardened neloy, bevel gears, running in a bath of oil. Crushing plates are of manganese steel and the frame is of cast steel in two pieces. The chute is fitted with renewable liner.



● LATEST ADDITION TO THE Symons short head cone crushers is the new 2-ft. size. Heretofore the smallest cone crusher of the short head type was the 3-ft. machine. This in many cases had too much capacity for some of the smaller sized plants making an extremely fine crushed product. The 2-ft. short head cone is designed for operating at ⅛- to ½-in. settings, with capacities from 8 to 25 tons per hour.

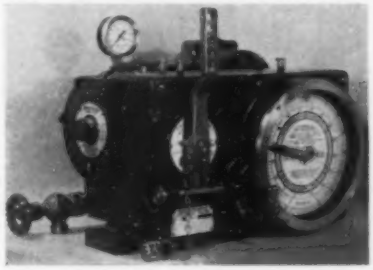
Batching and Mixing

MANUFACTURERS' Ideas

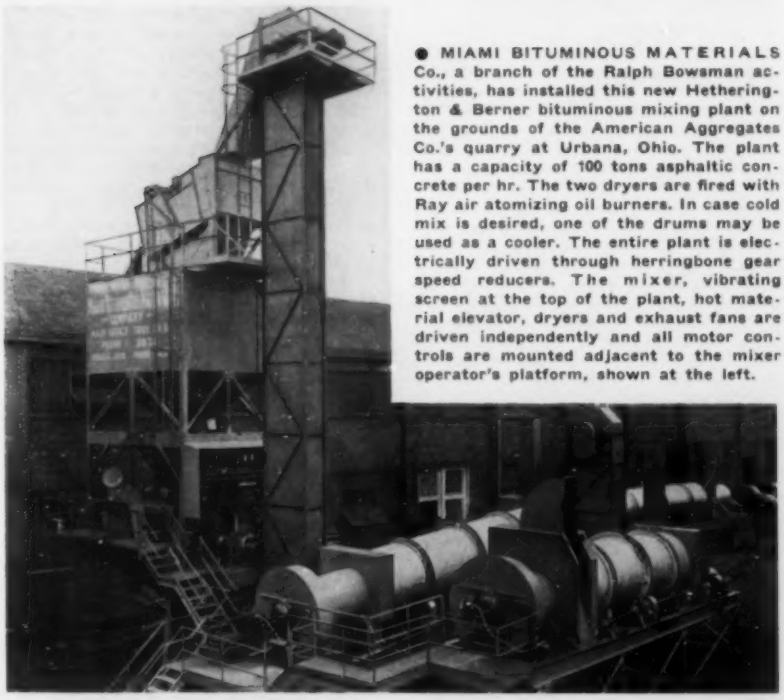


● LEFT: THE REGULAR 2-CU. YD. size of the new Butler portable concrete hopper is convertible to 3 or 5-cu. yd. by adding a removable top section. The hopper will take concrete from any high-discharge truck-mixer without use of a ramp. The hopper is available with three pneumatic-tired wheels and drawbar for pulling at high speed or may be obtained with heavy channel skids or base plates. Legs are adjustable in height to suit various clearances and the gates are of the jam-proof radial type.

●



● METER FOR ACCURATELY MEASuring water going into concrete mix. It is known as the "Repeat-O-Matic" meter and is made by Automatic Liquid Meter Co. There are really two devices: that shown, for measuring the water and a hydrometer for quickly determining surface moisture of the sand and coarse aggregate to an accuracy said to be less than one-half of one percent.



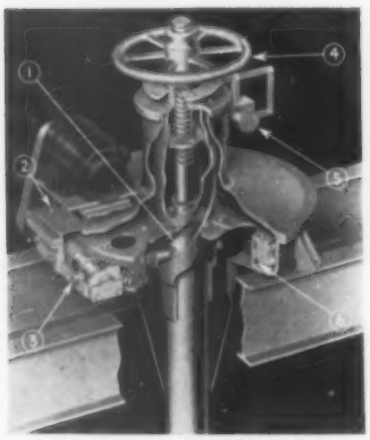
● MIAMI BITUMINOUS MATERIALS Co., a branch of the Ralph Bowsman activities, has installed this new Hetherington & Berner bituminous mixing plant on the grounds of the American Aggregates Co.'s quarry at Urbana, Ohio. The plant has a capacity of 100 tons asphaltic concrete per hr. The two dryers are fired with Ray air atomizing oil burners. In case cold mix is desired, one of the drums may be used as a cooler. The entire plant is electrically driven through herringbone gear speed reducers. The mixer, vibrating screen at the top of the plant, hot material elevator, dryers and exhaust fans are driven independently and all motor controls are mounted adjacent to the mixer operator's platform, shown at the left.

● BELOW: A 2-CU. YD. JAEGER "HIGH Dump" truck mixer discharging into a Jaeger portable hopper. New standard drum capacities increase the payload to the maximum that the trucks themselves should carry. Some features are a high discharge point, top loading in one drop, and dual-mix action. The portable hopper shown will take a 2 or 3-cu. yd. batch, meaning more payloads for truck mixer.

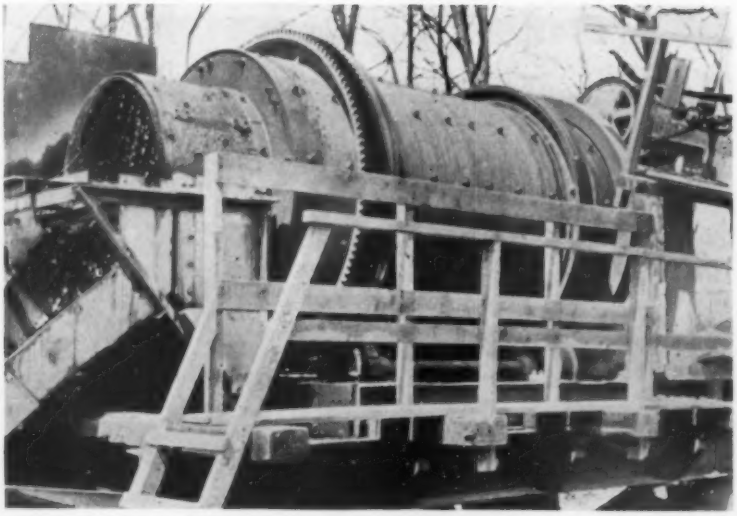
● ONE OF THE NEW LINE OF CHAIN Belt's Rex "Hi-Discharge" truck mixers and agitators which feature a high discharging point for greater spouting range and rear charging. The new mixing principle is said to make the drum self-cleaning while mixing. The rear charging hopper serves as a receiving hopper for aggregates while charging, serves as a stationary throw-back blade while mixing, and at the same time affords visibility or sampling of the batch.

MANUFACTURERS' *Ideas*

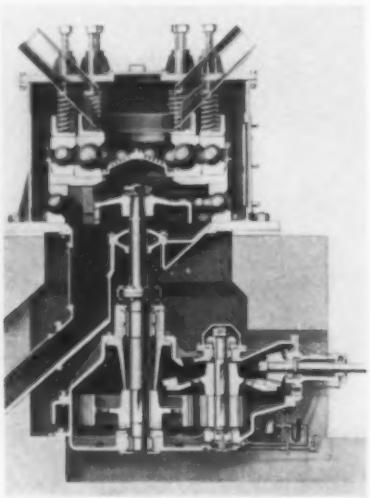
● NEW GENERAL ELECTRIC TRI-clad polyphase induction motor. Features of the line are a cast-iron box-type frame for better mechanical protection; use of Formex, a new type magnet wire, for better electrical protection; and a new design of sleeve bearing for better protection against operating wear and tear. It incorporates cast-aluminum rotor and pressure-relief system of greasing for ball-bearing motors. Use of Formex wire is said to make it possible to eliminate largely paper, cotton coverings, and other fibrous materials which absorb moisture and over a period of years deteriorate due to the effect of heat and chemical agents. Motor windings are further protected by application of an improved synthetic-resin varnish and a covering coat of Glyptal red.



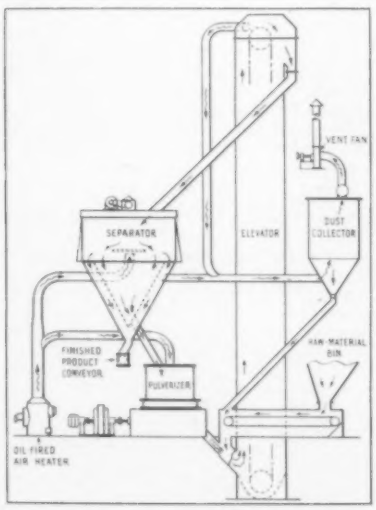
● THE "AUTO-RAISE" DRIVE MECHanism for thickeners and clarifyers. This has been developed by the Hardinge Co. as an automatic means of relieving the thickener of an overload in the tank, whether it is at the periphery or in the center. The principles of operation as shown in the illustration are (1) Rollers on scraper shaft are driven by a rotating, diagonally slotted tube. Excess pressure against the scrapers causes rollers to move up incline, raising shaft and scrapers. (2) Cover plate over the inspection opening. (3) Heavy adjusting set screws for quick and accurate alignment of worm shaft. (4) Manual raising wheel operates independently of "Auto-Raise" device. (5) Overload alarm and power cut-off switch operates when scrapers are raised near maximum position. (6) Ball bearings in oil filled casing support entire rotating mechanism and scrapers. Against the scraper shaft, under the automatic raising mechanism is a splash guard. Units are in operation in the United States, Canada, South America and Europe, handling very coarse, very fine and extremely heavy solids.



● ONE OF THE NEW TELSMITH Super-Scrubbers washing clay and dirt out of finished product. These scrubbers were and are being used in plants making aggregates for Pennsylvania Turnpike and the new Delaware Acqueduct in New York State. It combines the characteristics of several machines. The agitating and discharge mechanism resembles that in a concrete mixer. Abrading action is like that in a Telsmith washing screen, although greatly augmented, and the high speed drum, drum liners and perforated end plates resemble ballmill practice.



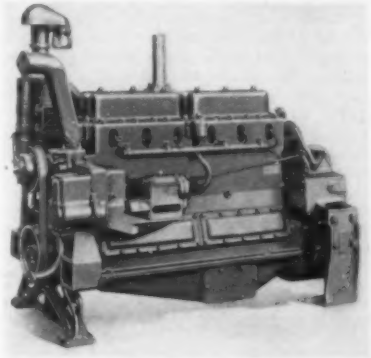
● IMPROVEMENT HAS BEEN MADE in the Babcock & Wilcox pulverizer used in the B&W closed-circuit system by provision for discharge of the material by gravity through a central opening in the base and chute leading to the elevator. In other words, the sweep has been eliminated. As a result of this change less power is said to be consumed and maintenance greatly reduced. The diagram to the right above shows another new feature of the B&W closed-circuit system. This is the introduction of hot air from a kiln or from a separately fired furnace into the pulverizers and separators. The heated air comes into contact with the wet material, dries it, and is vented through a dust collector. The raw feed is fed to the elevator, where it mixes with the hot circulating load before entering the pulverizers. The system is designed in accordance with the moisture content of the material to be handled in each individual installation. In addition to eliminating stone driers, this system requires less floor space and maintenance.



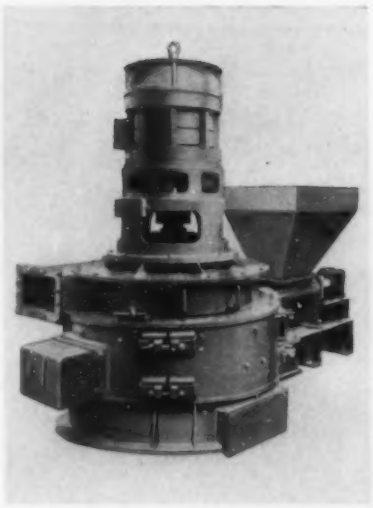
● AMODYN IS ATLAS POWDER CO.'S registered trade mark for a new series of ammonium nitrate base explosives which are said to show increased spreading action and reduce secondary blasting. Often, Amodyns may be substituted cartridge for cartridge for gelatins or semi-gelatins at considerable saving. They are available in high and low velocities.

MANUFACTURERS' Ideas

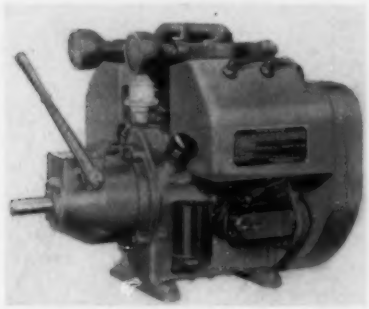
● BELOW: ONE OF THREE NEW models of Caterpillar heavy-duty natural gas engines, in two sizes, Model 4600G, a 6-cylinder and 4400G, a 4-cylinder. Both have a 4-¾in. bore and 5½-in. stroke and develop 74 and 48 hp. respectively at 1600 maximum governed r.p.m. A small four, Model 3400G with a bore and stroke of 3¾-in. and 5-in. develops 34 hp. at 1650 r.p.m. Electric sets, incorporating each of the engines coupled to a self-regulating generator, have also been announced. Natural gas conversion attachments for the 6- and 8-cylinder, 5¾-in. bore engines, rated at 140 and 190 maximum hp., respectively, are also manufactured. To change from Diesel to natural gas, the pistons in these attachments do not have to be touched, nor do any changes have to be made to interior parts of the engines. The entire change-over takes about four hours and can be done in the field.



● BELOW: A FEATURE RECENTLY added to the heavy-duty Dorr classifiers is the Robot lifting device, which automatically raises the rakes clear of the segregating pulp pool in case of a failure in the main power line. At the left below is the lifting device with gear cover removed and drive cover in place and at right is a shop view of a heavy duty classifier equipped with the lifting device. The Robot device is operated by a ½-hp. motor on a 32-volt d.c. battery circuit, charged by an a.c./d.c. rectifier. If the a.c. power line fails, a relay starts the d.c. motor. A limit switch stops it when the rakes reach maximum elevation. When the main power line is returned to service, the rakes may be lowered step-by-step by push button control.

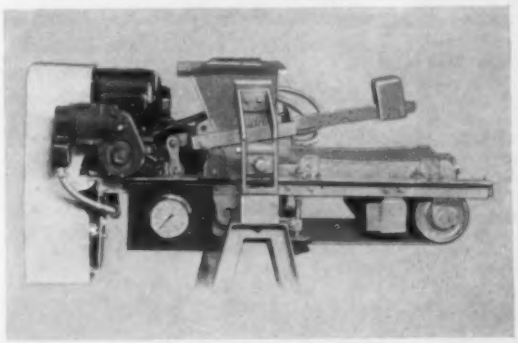


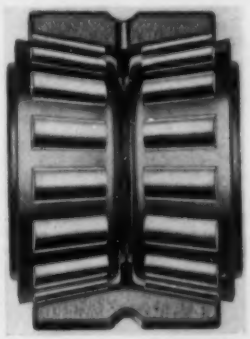
● SUCCESSFUL APPLICATION ON coal is being made in cement plants of the Whiting impact pulverizer. Among the changes incorporated for cement mill service is a design so that the wearing parts can be quickly replaced. The housing has removable sections on each side which are large enough to replace the liner sections and rotor plates without dismantling the whole machine. The pulverizer beaters can be quickly replaced by removing the tramp iron pocket. Another advantage is the fact that it requires very little space, making it possible to install the mill where there is limited room in front of the kiln without building alterations or additions. The pulverizer is said to provide a steady, uniform stream of finely pulverized coal to the burner. It is made in various sizes with capacities ranging from 3000 to 7000 lb. of coal per hour. While the Whiting impact pulverizer has been in extensive use in foundries, last year was the first it was applied to cement mills.



● OUTSTANDING FEATURES OF THE new Wisconsin Model VE4 four-cylinder engine are air cooling, Timken roller main bearings, light weight, and compactness. All parts are automatically lubricated. The engine is available in ratings from 1200 r.p.m. and 11-hp. to 2600 r.p.m. and 22-hp. This engine does not have a grease cup or oil fitting, as the oiling system is entirely self-contained.

● BELOW: MODIFICATION HAS RECENTLY been made of the Timken standard NA type, or non-adjustable, roller bearing. Made up of a double row outer race or cup and two single row inner races or cones, it is especially adapted to serve as a sheave bearing. The front cone faces are slotted and chamfered as shown to provide an entrance for lubricant to within the bearings. Sealing the chamber has been simplified by extending the length of the large cone rib.

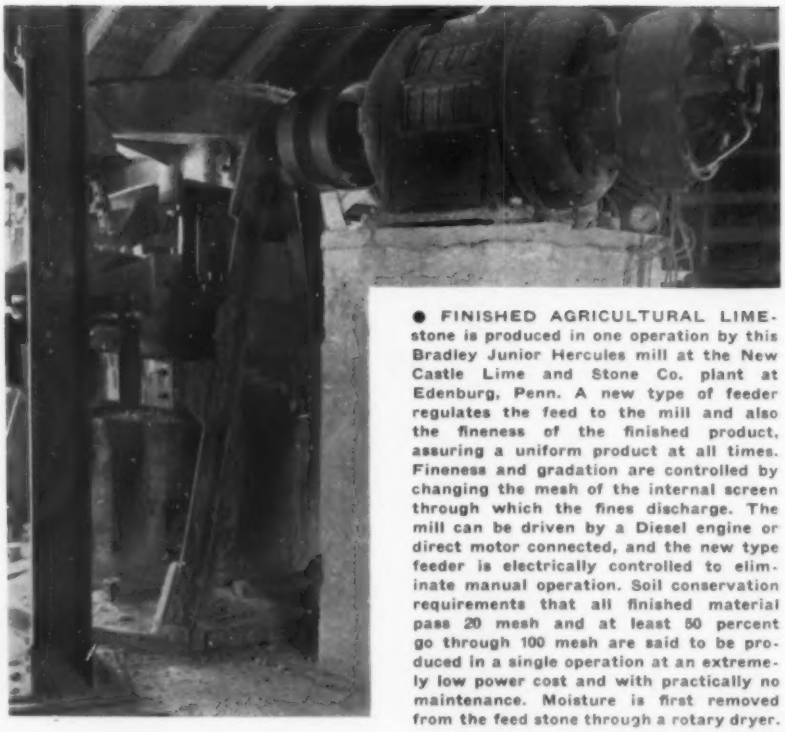




● ABOVE LEFT: A DIRECT RECORDing and totalizing attachment is incorporated in this new Hardinge weighing feeder. Like the Hardinge constant weight feeder, it uses the principle of a compensating balanced belt on a pivoted frame. A method has been developed to register by a pointer on a meter in calibrations of tons, pounds or kilograms. The meter has two weight recording registers, one for the total accumulated weight and the other a reset register to record batch or time runs. The same system may be employed for use when the feeder is controlled remotely, and the recording instruments may be placed on a panel any distance desired from feeder location.

MANUFACTURERS' *Ideas*

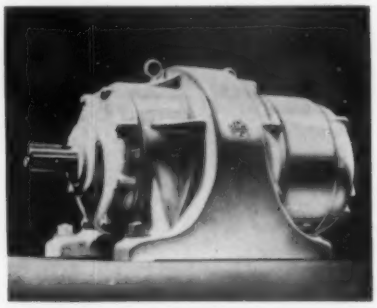
● A NEW FEATURE OF TAYLOR-WHARTON Tisco rivetless dredge buckets is the Tisco flexible tongue pin lock. As shown, the flexible tongue is forced against the underside of the pin head by a jack screw. Only a wrench is needed to keep the flexible tongue tight against the pin lug, preventing wear on the pin and front eyes by rocking.



● FINISHED AGRICULTURAL LIMESTONE is produced in one operation by this Bradley Junior Hercules mill at the New Castle Lime and Stone Co. plant at Edenburg, Penn. A new type of feeder regulates the feed to the mill and also the fineness of the finished product, assuring a uniform product at all times. Fineness and gradation are controlled by changing the mesh of the internal screen through which the fines discharge. The mill can be driven by a Diesel engine or direct motor connected, and the new type feeder is electrically controlled to eliminate manual operation. Soil conservation requirements that all finished material pass 20 mesh and at least 50 percent go through 100 mesh are said to be produced in a single operation at an extremely low power cost and with practically no maintenance. Moisture is first removed from the feed stone through a rotary dryer.

● STEPHENS-ADAMSON SEALMASTER hanger bearing mounted in a screw conveyor. The bearings are fitted with standard Sealmaster seals arranged to form an air-tight chamber which is said to keep out dirt and retain lubricant. The flow of material in the conveyor is not restricted, since the bearing housings are of Meehanite construction to give maximum strength in a minimum size casting and thereby provide considerably more than usual space in the screw conveyor.

● THIS NEW CLARK TRUCTRACTOR will handle loads as heavy as 7000 lb., and tier them in piles 15 ft. high. Known as the "Utilitruc," it is made in several models including a straight lift, a tilting and a telescopic tiering. Loads can be elevated at the rate of 7 in. per sec. and the machine travels at speeds from 1 to 7 m.p.h. It climbs ramps under load, has a rear wheel steer and hydraulic brakes.



● ONE OF THE DOUBLE AND TRIPLE reduction geared motors up to 30-hp. at 91 r.p.m. recently added to U. S. Electrical Motors, Inc., Syncrogear line. This larger unit incorporates the pyramidal gear pedestal design which provides ample support to withstand the extra torsional strains and load shocks of geared power. Both primary and secondary gears dip in a large oil reservoir in the pyramidal base which supplies oil without submerging any rotary parts.

● LEFT: COMPACT PORTABLE PLANT, Universal Crusher Co.'s latest, features the new Universal "two-in-one" roll crusher. Known as the "Pacemaker," the plant uses for primary reduction a jaw crusher and the "two-in-one" roll crusher, one-half of each roll being ¾-in. in diameter smaller than the other. Secondary reduction is done in two steps. The smaller roll gives an initial secondary crushing and the other half, fed from the second deck of the 4- x 8-ft. vibrating screen gives the final secondary crushing. Power for the unit shown is supplied by a 90-hp. Caterpillar RD-8 Diesel tractor, and capacities of 100 to 130 cu. yd. per hr. have been reported on the first installations.

LONG FLAME NOT ALWAYS EFFICIENT

Air-gas proportions and turbulency are important factors in lime kiln efficiency

By VICTOR J. AZBE

TO OBTAIN a waste gas analysis of zero carbon monoxide in either a vertical or rotary kiln does not by any means indicate that the loss due to incomplete combustion may not prevail, possibly even to a rather considerable extent. If an analysis could be made of the gases leaving the calcining section and these should be low in CO, then the assumption of no loss would be correct. But one would seldom find a kiln where this desirable state exists. Most kilns operating with low excess air will be passing gases which continue to burn into the preheating section of the kiln, and therefore wasting all of the heat still to be developed.

This all centers around the fact that it is typical of all types of kilns, and particularly rotary kilns, to have an excess of heat for preheating stone. That this is the case can be proved readily on theoretical grounds, and it is further evidenced that no matter how long we make the rotary, or how high the shaft kiln, we do not reduce the terminal temperature by any great amount.

The escape of burning gases over into the preheating zone, greatly increases the temperatures at the outlet. If complete combustion had taken place in the hot zone, more lime would have been made and so more stone would have passed through the preheating zone to cool the gases down to the minimum point. On the other hand, with combustion taking place over the line of the calcining-preheating boundary, the effect is virtually the same if there was a burner under the stack heating up the gases passing to the atmosphere.

In the rotary kiln plants, many operators want a long flame and we often see kilns in which the flame not only rolls into the preheating section, but often clear through and out at the end. In this latter case it means that all of the stone preheating was accomplished with the heat that should have been making the lime. To have radiant conditions in rotary kilns is, of course, very important, and a luminous flame will throw far more heat to the limestone surface than non-luminous, although equally hot gases. But still through too long a flame the fuel ratios will greatly suffer.

Within limits a somewhat too long flame, although lowering fuel economy, would raise kiln capacity. But the point is soon reached where this is not longer true, as the maximum of temperature and radiancy is obtained at close to perfect combustion. When there is a surplus of fuel the flame dulls, a harmful condition, since radiation is a factor of the fifth power of temperature difference and a small drop in temperature means a big drop in the heat transfer rate.

Relative Combustion Advantages of Rotary and Shaft Kilns

Both the rotary and vertical kilns stand apart in certain respects from any other combustion apparatus. The rotary kiln has about the greatest combustion space per unit of fuel burned, which tends to favor complete combustion. The vertical kiln is deficient in combustion space, but to offset this, favors the combustion process through intimate mixing and remixing of the streams while dodging the charge on the way upward.

In rotary kilns, after the initial turbulence, the flow is mainly laminar and there is but little intermixing between the upper and lower streams. Therefore if turbulence at the start is not sufficient to get the combustible and the air together in the atomic sense before reaching the end of the turbulent region, then combustion will be delayed far up through the kiln even if there is sufficient oxygen present in the whole.

Increasing the excess air, of course, will give a more rapid and complete combustion, under any set of conditions, when the loss due to carbon monoxide going over into the preheating zone will be less, but excess air will then be the carrier, the waster of heat over the line of demarcation between calcining and preheating sections.

Excess air is needed, of course, but the striving should be towards a state of turbulency under which combustion will be complete near the end of the calcining zone, under conditions of a minimum of excess air.

Shaft kilns tend to favor the combustion process. The hydrocarbons pass through a high temperature zone where they crack into elementary gases of CO and H. These gases are mixed and remixed repeatedly with air through the baffling effect of the lime in the vertical shaft, and this type of a lime kiln is the only combustion apparatus where the products can contain only carbon dioxide, nitrogen and moisture simultaneously with no oxygen and no carbon monoxide; and even when air is deficient in amount and there is CO on the order of several percent, and the fuel is a hydrocarbon gas, none of the latter will be found in the waste gases.

To obtain this unusual state of perfect combustion, the initial air-gas distribution must be right. If there is insufficient oxygen, then naturally there will be CO present.

LIME FORUM

Mr. Azbe, consulting engineer, is a contributing and consulting editor of ROCK PRODUCTS. He will be glad to receive inquiries from his readers, and will answer these direct or through the columns of this Forum.

A shaft lime kiln also has many vertical streams and there is not much mixing between them. For best results air-gas proportions must be close to right in all these streams, which is not altogether easy to accomplish in most kilns.

As the streams must start close to right in the oxygen-combustible proportion, when beginning their upward travel, heat is developed in the 10 or 12 ft. of height in which the lime is made. It is true that if one stream deficient in air mixes with another having an excess above this level, a state of complete combustion will result, but the heat will be developed late, high up in the kiln, possibly developed too late to make lime and, as in the case of rotary kilns, to all effects and purposes be wasted.

A state of complete combustion is desired in this case with a minimum of excess air in all of the many separate streams that independently percolate up through the lime. Otherwise there will be a loss regardless of the terminal indications.

Rock Wool Production

(Continued from page 89)

Some of the newer plants are particular in having closely-sized, unsegregated feed materials, and uniform coke size.

Several designs for blow pipes have been devised to produce a wool with no shot content but with indifferent success. Most of the pipes have a V-slotted nozzle, and some of them have mechanical devices to enable changing the direction of the steam or air into the molten stream. A higher viscosity melt is required for good quality wool than is desirable to produce high capacity, which is one of the difficulties facing the industry.

There is an apparent trend toward splitting the molten stream by a process of double notching, in which the stream is split into two streams and each is blown separately. Division of the stream gives the molten stream time to cool to the correct viscosity and is also a means of increasing production.

Fluxes

A recent report by the Illinois State Geological Survey, by J. S. Machin and J. F. Vanecek, tells of some interesting studies made on the effect of adding fluorspar to a mineral wool mix. Fluorspar was known to have a thinning action on a slag melt, that would likely affect the character of mineral wool fibers. Conclusions, based on actual tests, were that fiber diameters may be reduced considerably by adding fluorspar when the melt without fluorspar is highly viscous, so that the fibers of the wool produced from it are coarse. In one extreme test series, with a pouring temperature of 1400 deg. C., the fiber diameter was reduced more than 50 percent by the addition of one percent of fluorspar. The same melt, when blown at 1500 deg. C., produced only a slight reduction in fiber diameter with the same fluorspar addition.

When the melt is sufficiently fluid to produce fibers of 2 or 3 microns diameter, the addition of fluorspar has little effect insofar as causing further reduction in fiber diameter is concerned, which was interpreted as indicating that there is perhaps a lower limit to the fiber diameter. As a rule, when small additions of fluorspar caused considerable reduction in fiber diameter, larger additions did not cause proportionate reductions.

J. R. Thoenen reports that changes in diameter or length of the molten stream before blowing change the characteristics of wools and that some manufacturers of mineral wool are actually using differences in lengths of streams to blow wool to meet different specifications.

Trends in Fabrication

Fabrication methods are also in a period of change. Manufacturers who started in the business several years ago have originated some clever arrangements to automatically cut wool blankets into accurate sizes for boxing. Binders of various types are being blown into the wool as it is fiberized to hold a batt in shape. Rosins, resins or starch are the common types. According to Stewart and Richardson (already referred to) one of the binders originally used, sodium silicate, has been discarded. Its use tended to cause distintegration of the wool. Sometimes wool fibers are coated with wax or metallic soaps to make them water-repellent. Paraffin oils are steam-injected at some plants to prevent dusting and to make a more resilient product.

COMING CONVENTIONS

National Sand and Gravel Association and National Ready Mixed Concrete Association, Netherland Plaza Hotel, Cincinnati, January 15, 16 and 17.

National Crushed Stone Association, Netherland Plaza Hotel, Cincinnati, January 20, 21 and 22.

American Road Builders' Association, New York City, January 27, 28, 29 and 30.

National Concrete Masonry Association, Sherman Hotel, Chicago, February 10, 11, and 12.

American Concrete Pipe Association, Edgewater Beach Hotel, Chicago, Ill., February 10 and 11.

American Concrete Institute, Mayflower Hotel, Washington, D. C., February 18, 19, and 20.

The Sand-Lime Brick Association, Hotel Sherman, Chicago, February 10, 11 and 12.

National Concrete Burial Vault Association, Stevens Hotel, Chicago, May 13, 14 and 15.

Some customers prefer a paper covering on one or both sides of a wool batt, and these coverings are applied in many of the modern plants without interruption in handling. The paper has a gummed side and is threaded from its roll, between the wool blanket and a special roller on the under side. The roller has live steam circulating through its length which melts the gum and pressure sticks the paper to the wool.

Concrete Associations Meet in February

NATIONAL CONCRETE MASONRY ASSOCIATION holds its annual convention, February 10, 11 and 12, 1941, at the Hotel Sherman, Chicago, concurrently with the annual meetings of the National Cinder Concrete Products Association, the Cast Stone Institute, American Concrete Pipe Association, and concrete contractors. Another feature will be the Concrete Industries Exposition, showing all the latest developments of interest to concrete products manufacturers, ready mixed concrete producers, and concrete contractors.

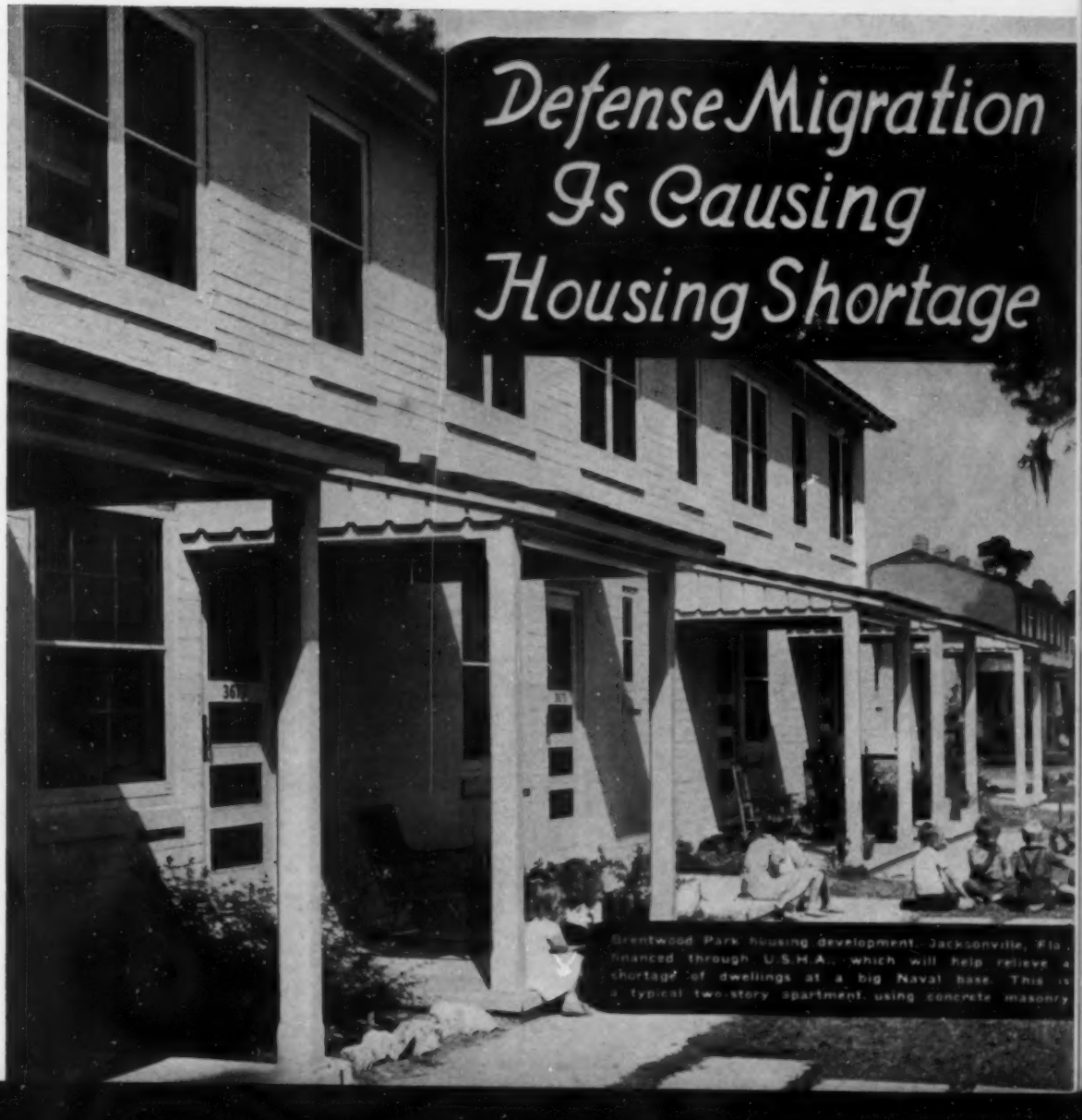
Concrete products men will meet jointly in one session with contractors in a discussion centering about the concrete residence floor as the greatest undeveloped market for concrete products manufacturers and contractors.

Particular subjects up for discussion by concrete products manufacturers include: the value of a laboratory for a concrete products plant; standard specifications and recommended revisions; scored concrete units as a means of economy in constructing concrete masonry walls; a new method of reinforcing concrete masonry walls; drying concrete masonry units through the use of heated forced air; the practicability of high pressure steam curing for average sized plants; joists; and the design of the typical three core unit. Contractors will discuss, among other things, the use of ready-mixed concrete.

Cast Stone Institute meets, February 10 and 11 at the Bismarck hotel to witness demonstrations of new methods in cast stone work. There will be demonstrations of the new aggregate-transfer idea, the actual use of some of the newer tools of the industry and a new method of executing ornamentation of cast stone.

Concrete pipe manufacturers meet the same days at the Edgewater Beach hotel to discuss specifications revised in 1940 by A.S.T.M., manufacturing problems and promotional activities with particular emphasis on national defense.

CONCRETE PRODUCTS AND CEMENT PRODUCTS



Greenwood Park housing development, Jacksonville, Fla., financed through U.S.H.A., which will help relieve a shortage of dwellings at a big Naval base. This is a typical two-story apartment, using concrete masonry

Airplane hangar at Fort Ripley, Minn., constructed with concrete floors, concrete masonry walls, and concrete tile roof

Billion Dollars For Buildings

Producers of concrete products should strive for larger share of defense construction awards

By RALPH S. TORGERSON

NEARLY A BILLION DOLLARS has been made available for defense housing through federal legislation, enacted during the past six months, which will be spent through June 30, 1942. Most of the so-called temporary housing for the navy and army is now well under way, and it is anticipated that more than 90 percent will have been completed by January 1, 1941.

This temporary housing consists largely of wooden construction, including barracks, mess halls, store houses, etc., and very little money has gone into structures using concrete masonry units. With the rise in lumber prices, however, it is expected that serious consideration will be given to the use of more permanent types of buildings which can be built at a price competitive with wood. It will also permit the use of masons for this work and relieve the shortage of experienced carpenter labor.

A more vigorous fight for this business on the part of concrete masonry producers also would be helpful in securing a fair share of these defense contracts. The concrete products industry has an excellent opportunity to put across a real sales argument. Concrete masonry construction is permanent, fire-safe, vermin-proof, and requires little maintenance. If the conscription law is to be made permanent legislation, as many believe it will, the government must consider permanency in its construction program. Speed was the compelling factor in selecting wooden construction, but concrete masonry structures can be erected almost as rapidly as wooden buildings.

In spite of this favoring of wood construction as against concrete masonry, quite a number of barracks, mess halls, airplane hangers, and hospitals have been built with concrete masonry units. Chanute Field, big army technical training school at Rantoul, Ill., has two mess halls under construction which will require 49,000 standard 8- x 8- x 16-in. lightweight aggregate concrete units or equivalent. They will be painted inside and outside with portland cement paint. This army airport also has a large structural concrete mess hall in the area containing permanent structures which has concrete masonry back-up units. Similar mess halls of concrete masonry are under construction at Fort Scott, Belleville, Ill., and Lowry Field, Denver, Colo.

Fort Ripley, Minn., has a complete concrete airplane hanger with concrete floors, concrete masonry walls, and concrete tile roofs. This large cantonment for training the National Guard also has a complete unit of barracks and mess hall built with concrete floors, concrete masonry walls, and concrete tile roofs.

Camp Perry, Ohio, near Toledo, has a number of mess halls and 22 miscellaneous buildings constructed with concrete masonry units. Mess halls are approximately 20- x 180-ft.

Typical of the more permanent types of housing projects is the construction view of the Major Bowman Terrace, Vincennes, Ind., financed by U.S.H.A. It has concrete masonry walls and partitions, precast joists, sills, and lintels, and cast-in-place floors

Concrete masonry units also are used for powder magazines, storage buildings, etc.

Specification Requirements for Concrete Masonry

For the benefit of those producers who are planning to bid on defense housing jobs some of the important details concerning concrete masonry specifications issued by the Construction Division, Quarter Master General's office for new mess halls at Chanute Field are given below.

All concrete masonry units must conform to Federal Specification SS-C-621. Walls are of light-weight aggregate concrete block, either Waylite or Haydite, painted with portland cement paint. Load-bearing solid concrete blocks are to be used for the cold storage room walls. All units are to have dense surfaces, and coarse, open textured units are not acceptable. Concrete units must be free from ingredients which may cause corrosion of metal. Although 8- x 8- x 12-in. units were specified, the contractor sought permission to change to the 8- x 8- x 16-in. standard. The specification requires that samples of the units be submitted to the constructing quartermaster officer.

Mortar Materials

Detailed specifications are outlined for laying up the units in the walls. Blocks are to be cut with a carborundum power saw. The contractor has the option of using either of the following mortars: portland cement mortar; 1 part of portland cement, 1 part lime putty, 6 parts sand; masonry cement mortar, 1 part masonry cement and 3 parts sand; and lime putty.

Portland cement is to conform to Federal Specification SS-C-191a, masonry cement to Federal Specification SS-C-181b, and only one brand is to be used by any sub-contractor. Sand is to be of the following gradation: No. 8 mesh, passing 100 percent; No. 16 mesh, 5 percent retained; 100 mesh, 97 percent retained.

Mess Hall at Chanute Field, Army Air Corps technical training school at Rantoul, Ill., constructed with architectural concrete walls and roof and masonry backup

Hydrated lime is to conform to Federal Specification SS-L-351, Type F, and pulverized quicklime is to conform to Federal Specification SS-Q-351. All quicklime must pass a No. 20 sieve and at least 90 percent must pass a No. 50 sieve. An autoclave soundness test is also provided for lime.

Army ordnance magazine at one of the eastern camps is constructed of concrete masonry units

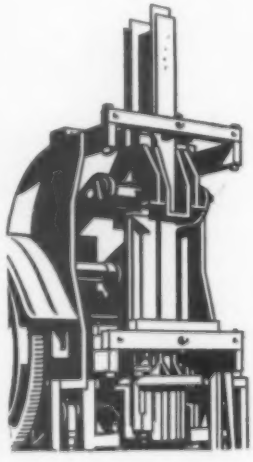
Entirely new communities will be built up surrounding new ordnance and powder plants now building or contracted for. In addition to these new towns, a tremendous expansion in production facilities for the defense program will cause an influx of population in existing towns and cities who cannot be adequately housed without constructing new units. In addition to this pressing need for new homes, the housing situation in cities near large army and navy training bases is acute. For example, Alexandria, La., near Camp Beauregard normally has a population of 25,000 but today is trying to care for a population of 65,000.

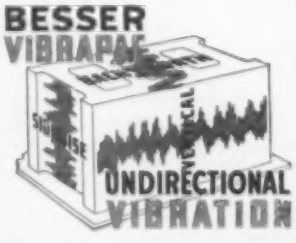
Civilian Housing for Defense Industries

While little of the $630,000,000 for temporary construction at army camps and naval training stations has gone into concrete masonry construction, there still remains a vast market for housing for civilian workers, and army and navy officer's families which will have to be of a more permanent type. Appropriations for army and navy family housing comprise 26,000 units to cost $100,000,000. Another appropriation of $150,000,000 is available to supplement the army and navy family housing and for housing in connection with industrial plant expansions not otherwise provided by private housing. This work will be done under the Public Buildings division of the FWA. Another source of building funds is a sum of $40,000,000 set aside by the RFC to finance building corporations formed to meet defense needs in established communities. About 80 percent of the cost will be financed through FHA insured mortgages and a 50 percent equity secured by stock in the corporation. In addition to these funds, about $30,000,000 already has been made available through USHA for community housing in selected defense areas.

President Roosevelt, acting under authority of the Lanham Act on the recommendations received from Chas.

Major Bowman Terrace housing project nearing completion. Job required 105,400 concrete masonry units and 23,000 ft. of precast joists.





BESSER
PLAIN PALLET STRIPPERS
Exclusive features

Plain Pallets

Besser Plain Pallet Strippers are the only Stripper block machines that make all sizes of units on one set of pallets. This original feature is fully patent protected. Introduction of the Plain Pallet Strippers by Besser was the greatest single advancement ever made in the industry.

Fully Pressed Top

Besser FULLY PRESSED TOP Units are known as "true and perfect as cut stone." The FULLY PRESSED TOP feature was a natural result of further simplifying Besser Strippers. Their perfection of quality and appearance gives them sales appeal of great value to any products plant.

Heavy Tamping

Besser Plain Pallet Strippers have gained a reputation for superior quality blocks made by heavy, dense tamping. Besser Tampers are in use in all parts of the country, using every type of aggregate with successful results.

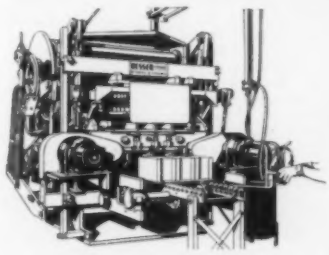
100% Automatic

Bessers are the only Fully Automatic Block Machines with continuous full capacity operation and no machine operator. **The machine sets and keeps the pace.** Pallets fed and placed automatically. Automatic front conveyor may be used.

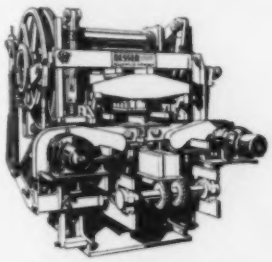
Undirectional Vibration

Undirectional vibration under Flam patents (other patents pending) now used exclusively on the Besser Vibrapac, was used to make the first vibrated blocks ever made on a production basis and sold commercially. The Besser Vibrapac combines undirectional vibration principles with the exclusive Besser Plain Pallet principle. Vibrapac vibration can be controlled to make units of any texture or density desired. Thus the original and oldest block vibration method becomes the newest and most up-to-date.

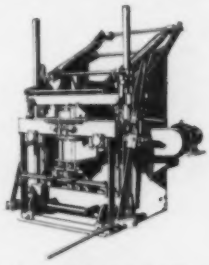
EVERY CONCRETE PRODUCTS PLANT NEEDS A BESSER PLAIN PALLET STRIPPER



Besser Super Plain Pallet Vibrapac —4800 per day



Besser Victory Plain Pallet Vibrapac —2160 per day



Besser Master Plain Pallet Vibrapac —800 per day

Besser Multi Mold —250 per day

BESSER

PLAIN PALLET STRIPPERS

first

in Low Initial Cost

A typical average case where 9 sizes are being made showed a saving in pallet cost of $19,144.00. Other first costs were practically the same in proportion to production capacity. (Details and complete figures on request.) There are other every day savings with plain pallets, such as handling, storage, wear, etc.

in Low Operating Cost

A typical plant equipped with a Besser Super Vibrapac Plain Pallet Stripper shows a saving in operating cost of $75.20 per 5000 blocks over production with former cored pallet machines. This saving pays for the Vibrapac in 150 days. (Details on request.)

in Quality Product

FULLY PRESSED TOP blocks made on Besser Plain Pallet Strippers have had preference of leading architects and builders since their first introduction by Besser. With Besser Vibrapac machines, density and texture can be controlled for making either dense or open textured blocks as desired.

in Durability and Long Life

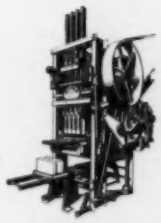
Besser Plain Pallet Strippers have few revolving parts and are equipped with anti-friction bearings. With Plain Pallets there is no wear on cores and mold liners by pallets, as Plain Pallets are fed **under** the mold instead of **into** it causing damaging wear. Besser Vibrapacs have mold insulated from frame with rubber to protect machine from shock and wear.

Write for "21 Advantages of Plain Pallets"

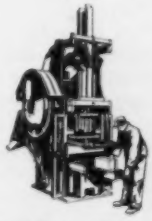
BESSER MANUFACTURING COMPANY

COMPLETE EQUIPMENT FOR CONCRETE PRODUCTS PLANTS

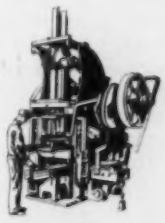
201 41st STREET **ALPENA, MICHIGAN**



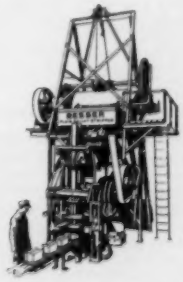
Besser Champion Plain Pallet Stripper—1000 per day



Besser Semi-Automatic Plain Pallet Stripper—1680 per day



Besser Victory Fully Automatic Plain Pallet Stripper—2160 per day



Besser Super Fully Automatic Plain Pallet Stripper—3120 per day

THE SAVING IN PALLET COST WILL PAY FOR ANY BESSER PLAIN PALLET STRIPPER

Truck mixer equipment of the D. J. Kennedy Co., Pittsburgh, Penn., which transported concrete to the Terrace Village housing project. A batching plant was erected on the site to shorten the haul which involved the handling of about 38,000 cu. yd. of concrete

F. Palmer, defense housing coördinator, has approved immediate construction of housing projects at 63 sites. These locations are as follows: California — Benicia, Fresno, San Diego, San Rafael, Stockton, Sunnyvale, Fort Ord, Riverside; Arizona—Fort Huachuca, and Tucson; Delaware City, Dela.; Florida—Orlando, Tallahassee, West Palm Beach, and Tampa; Georgia—Augusta, Columbus, Rossville, and Savannah; Illinois—Belleville, Rantoul, and Savannah; Boise, Idaho; Fort Knox, Ky.; Bangor, Maine; Maryland—Aberdeen and Edgewood; Jackson, Miss.; New Jersey—Long Branch, Fort Dix; Albuquerque, N. Mex.; Corydon, Iowa; Colorado—Denver and Lowry Field; Rollo, Mo.; Fort Riley, Kans.; Massachusetts—Chicopee and Fort Devens; Maryland—Baltimore and Odenton; Michigan—Battle Creek and Mt. Clemens; New York—Fishers Is. Village and Hempstead, L. I.; Fayetteville, N. C.; Columbia, S. C.; Fort Meade, S. Dak.; Fort Sill, Okla.; Texas—Houston, El Paso, San Angelo, Fort Clark, and San Antonio; Virginia—Lee Hall, Arlington, Virginia Beach, Langley Field, and Phoebus; Washington—South Tacoma, Fort Lewis, and Spokane; Island of Oahu, T. H.; and Puerto Rico.

Offices of Government Reports On Defense Construction

Alabama, 247 Federal Bldg., Birmingham
Arizona, 213 U. S. Courthouse, Phoenix
Arkansas, 426 Donaghey Bldg., Little Rock
California, 215 Sharon Bldg., San Francisco
Colorado, 245 Customhouse, Denver
Connecticut, 333 Post Office Bldg., Hartford
Delaware, 413 New Customhouse, Philadelphia, Penn.
Florida, 1210 Lynch Bldg., Jacksonville
Georgia, 404 Candler Bldg., Atlanta
Idaho, 404 Federal Bldg., Boise
Illinois, 876 U. S. Courthouse, Chicago
Indiana, 301 Chamber of Commerce Bldg., Indianapolis
Iowa, 407-A Old Federal Bldg., Des Moines
Kansas, 208 Federal Bldg., Topeka
Kentucky, 431 Federal Bldg., Louisville
Louisiana (see Arkansas)
Maine (see Massachusetts)
Maryland, Office of Government Reports, Washington, D. C.
Michigan, 409 Federal Bldg., Detroit
Minnesota, 1027 Post Office Bldg., St. Paul
Mississippi (see Arkansas)
Missouri, 934 Federal Bldg., St. Louis
Montana, 602 Power Block, Helena
Nebraska, 229 Post Office Bldg., Omaha
Nevada (see California)
New Hampshire (see Massachusetts)
New Jersey (see Pennsylvania)
New Mexico (see Arizona)
New York, 45 Broadway, New York, N. Y.
North Carolina (see Virginia)
North Dakota, First National Bank, Mandan
Ohio, 1405 Central National Bank Bldg., Cleveland
Oklahoma, 433 Key Bldg., Oklahoma City
Oregon, 620 Park Bldg., Portland
Pennsylvania, 413 New Customhouse, Philadelphia
South Carolina, Liberty Life Bldg., Columbia
South Dakota, 305 Federal Bldg., Sioux Falls
Tennessee, 210 Federal Bldg., Memphis
Texas, 208 Old Post Office Bldg., Austin
Utah (see Idaho)
Vermont (see Massachusetts)
Virginia, 1022 American Bldg., Richmond
Washington, 1313 Exchange Bldg., Seattle
West Virginia, Chamber of Commerce Bldg., Charleston
Wisconsin (see Illinois)
Wyoming (see Colorado)

Tough going for transit mixer trucks of Pennsylvania Supply Co., due to muddy roads into cantonment. In some locations it was necessary to dump into wheel barrrows for pouring

Gateway Gardens housing project, Kokomo, Ind. This unit has concrete masonry walls. Ready mixed concrete for foundations and floors is handled with a Pumpcrete machine

Ready-Mix Goes Co-operative

Nine ready mixed concrete companies in Wisconsin form association to standardize on quality, promote the use of the product, and pool use of equipment

TRANSIT MIXED CONCRETE is a relatively new construction material in the Fox River Valley of Wisconsin. Practically all the larger cities and others which might be classified as towns have one or more plants. Most of them have been built in the last two or three years. Ready Mixed Concrete Co., Green Bay, pioneered the product a little over five years ago.

Successfully promoting ready-mixed concrete and making a go of it as a business offer quite a challenge in cities and towns which range from 9000 population to a top of 40,000 to 50,000. In such areas a lot of missionary work must yet be done.

Location of these plants and a prospective volume of business necessarily much lower than in larger cities have their effects on the maintenance of service, which is one of the principal benefits of ready-mixed concrete and a most important argument for sales.

Fox River Valley towns have very cold winters with their attendant complications. All the batching plants are of steel construction, practically all are enclosed and insulated, and they are all equipped to heat sand, coarse aggregate and mixing water to operate under nearly all climatic conditions.

Delivery equipment comprises fleets of two to five transit mixers dependent upon location of each plant, with a maximum of nine at one plant in Green Bay where ready-mixed concrete is established as standard practice. As all the mixers are 2- or 3-cu. yd. capacity, it is apparent that delivery equipment entirely adequate for a normally small volume of concrete in the smaller cities cannot always render adequate service in the event some large construction project might come up.

Pool Use of Mixer Trucks

Such unforeseen fluctuations are provided for as part of the activities of the Ready Mixed Concrete Association of Wisconsin, an organization of producers formed in 1939. This association is a very active group which holds regular meetings and functions principally for the purpose of promoting more widespread use of ready-mixed concrete. Its membership consists of approved producers in the Fox River Valley but membership will likely become more state wide to embrace more of the cities having similar problems.

J. E. Carey, secretary-treasurer of the new association

Henry Beemster, president, Ready Mixed Concrete Association of Wisconsin

Henry Beemster, Ready Mixed Concrete Co., Green Bay, is president; J. E. Carey, The Spindler Co., Manitowoc, secretary-treasurer; and Walter P. Miller, Valley Ready Mixed Concrete Co., Inc., Appleton, vice-president. Member companies are Valley Ready Mixed Concrete Co., Inc., Appleton; Ready Mixed Concrete Co., Green Bay; Courtney and Plummer, Neenah; Cook and Brown Lime Co., Oshkosh; Schuster Quality Concrete Co., Green Bay; The Spindler Co., Manitowoc; Central-States Construction Co., LaCrosse; Van Der Vardt Brick and Supply Co., Sheboygan; The William Fricke Sons Co., Manitowoc.

Much has already been accomplished toward improving business conditions for member companies and for the general good of the ready-mixed concrete industry in the eyes of the consumer by pooling the experiences of a group of producers. Business meetings are held monthly and in the several cities where member companies are located.

Educational Program

Member companies are encouraged to bring guests to some of the meetings, and appropriate entertainment is provided for mayors, engineers, city officials in charge of public works,

Typical of the types of plants found among the association members is the all-enclosed plant of Cook & Brown, Oshkosh, Wis.

No Wonder Jaeger OUTSELL ALL OTHER

12 Years of EVER-INCREASING LEADERSHIP, Culminate in These 1941 Models — THE COMPLETE

CHECK LIST

EXCLUSIVE FEATURES THAT EXPLAIN JAEGER'S EVER GROWING LEADERSHIP

(A) ON BOTH "LOW-CHARGE" AND "HIGH DUMP" UNITS

1. "DUAL-MIX" END-TO-END MIXING WITH THROW-BACK REVERSING BLADES, producing higher strength, more workable concrete.
2. FASTER MIXING AND DISCHARGE of either high or low slump material.
3. QUICK ACTING CHARGING AND INSPECTION DOOR—Can take full batch in one drop through the top.
4. DUAL REVOLVING WATER SPRAYS —100% faster, spray uniformly from end to end of drum.
5. SYPHO-METER WATER TANK, accurate within ½% of tank capacity.
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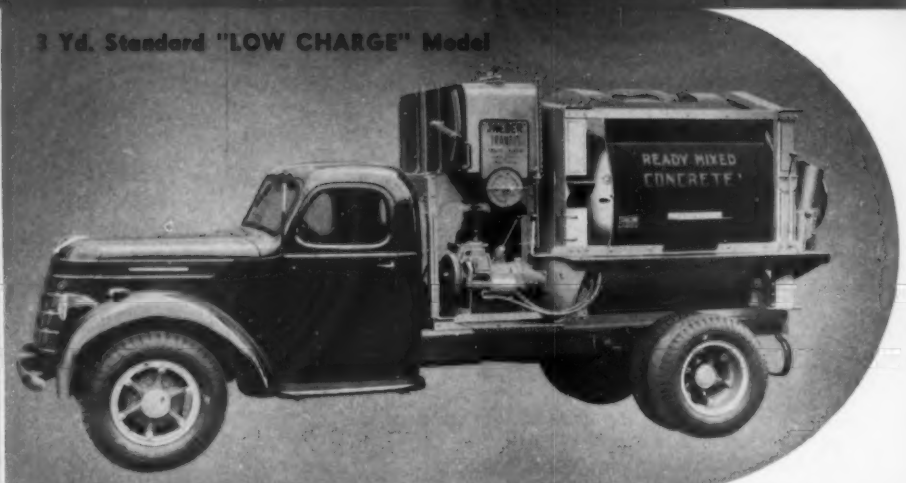
7. "WINTER SAFETY" WATER BOOSTER.
8. TWO-SPEED SHOCK-PROOF TRANSMISSION for long or short hauls or agitation.
9. VACUUM CAB-CONTROLLED TRUCK ENGINE DRIVE or SEPARATE ENGINE DRIVE.
10. COMPACTNESS—2 Yd. size can be mounted on Ford-type trucks.
11. COR-TEN STEEL (both corrosion and rust resisting) and highest type Automotive Construction throughout, insuring lowest maintenance costs.

(B) ON "HIGH DUMP" UNITS ONLY

1. "SURE-SEAL" models to meet rigid specifications, with
2. AIR-TIGHT VACUUM-CONTROLLED DISCHARGE DOOR
3. "DUAL-LOADERS" equipped for both top and end loading to meet different conditions, with
4. LEAK-PROOF CHARGING-DISCHARGING HOPPER

3 Yd. Standard "LOW CHARGE" Model



2 Yd. "SURE-SEAL" HIGH DUMP Model on Ford-Type Truck

JAEGER PORTABLE HOPPER

Keeps Your Truck Mixers Moving— Means 25% More Payloads per Day on Average Job

Tows to job with the first truck mixer load, takes 2 or 3 yd. batches at a time, permits mixers to return immediately. One hopper serves a big job. A few keep average fleet busy. Get our low price.

MORE CONCRETE IS SOLD BY JAEGER TRUCK MIXERS

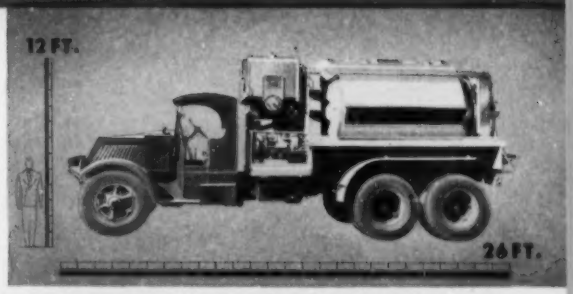
Truck Mixers, Agitators MAKES COMBINED!

Since Jaeger Pioneered the MODERN Truck Mixer, ANSWER TO TODAY'S READY-MIX DEMANDS

Standard **LOW CHARGE** TRUCK MIXERS, AGITATORS in 2 to 8 Yd. Sizes

Offered in 6 improved models—lowest to load (thus saving on bin equipment), fastest to mix and discharge any slump concrete, and equipped with larger "Dual-Mix" drums which take the payload capacity of modern trucks. In addition, many exclusive Jaeger operating features shorten the payload trip, increase the number of daily payloads, achieve maximum daily production of higher strength concrete.

Buy wisely—see "Check List" at left—it shows why these units are the overwhelming choice of operators who do steady, big volume business.



JAEGER BUILDS WORLD'S BIGGEST TRUCK MIXER FLEET FOR NEW YORK CITY OPERATORS:

Over 160 Units, in Sizes Up to 8 Cu. Yds., equipped with Jaeger Truck Engine Drive, Vacuum Controlled from Cab, Unanimously Chosen by Nine New York Operators to Modernize Their Plants. Jaegers were Selected after Comparison with All Makes. Steady Repeat Orders Have Followed Original Purchase.

HIGH DUMP TRUCK MIXERS, AGITATORS

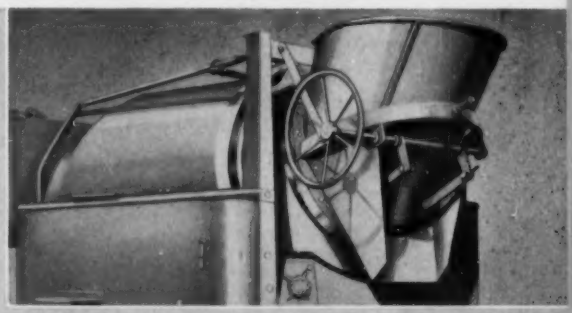
2 to 5 Yd. Sizes, Offered in Two Types to Meet Every Condition

(A) "SURE-SEAL" MODELS with Top-Loading and Inspection Door and Vacuum-Controlled Discharge Door, Giving Air-Tight Drum.

(B) "DUAL-LOADING" MODELS Equipped with Both End Loading Hopper and Top-Loading and Inspection Door.

Only Jaeger offers you truck mixers that combine high discharge with the ability to meet every specification and demand. Have all the proven features that have made Jaeger the acknowledged leader—bigger sizes of Dual-Mix Drums with Throw-Back Reversing Blades insuring higher strength concrete—fastest of their type to mix and discharge low slump material—Two-Speeds for long or short hauls or agitation—Shock-Proof Transmission with Vacuum Cab-Controlled Truck Engine Drive or Separate Engine — "Winter-Safety" Water Booster and Dual Revolving Sprays—Compactness to mount on Ford-type trucks.

Buy wisely—see "Check List"—it shows why Jaeger HIGH DUMP is outselling all other high discharge types.



ONLY JAEGER OFFERS "DUAL-LOADING" WITH END CHARGING-DISCHARGING HOPPER

When equipped with Jaeger Leak-Proof Charging-Discharging Hopper, HIGH DUMP Truck Mixers can be either end-loaded or top-loaded, as desired. For fastest charging and rigid specifications, drum will take full rated batch in one drop through Top Door. For bigger drum load, requiring additional mixing, drum can be end-loaded through Hopper. Hopper discharges through slide gate, retains tight seal with drum at all times.

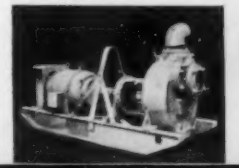
ALL JAEGERS ARE EQUIPPED WITH TOP DOOR FOR INSPECTION OR LOADING WHEN DESIRED.

JAEGER AUTO-PAVERS WITH JAEGER SCREW SPREADER

The mobile paving plant of today — easily equals 34E Paver output with substantial reduction of costs and improvement in slab. Used in numerous States, growing in popularity. Get Catalog TMP-41.

PUMPS FOR GRAVEL WASHING AND DRAINAGE

World's largest selling pumps of their kind. Combine 100% automatic priming with high centrifugal efficiency. Meet any demand up to 240,000 G.P.H. Cut costs. Ask for catalog and prices.



MIXERS TO 565 SIZE

Most complete and largest selling line in world.

"TOUCH CONTROL" HOISTS to 100 H. P.

Most advanced design, finger-tip control.

"EASY DUMP" CARTS to 11 CU. FT.

Save Truck Mixers waiting on jobs. Ask for prices.

GET THESE 1941 FACTS FOR READY-MIX PRODUCERS—MAIL TODAY!

New Data, Specifications, Prices, Terms—Just Off the Press. Check Information Wanted and Mail Slip

THE JAEGER MACHINE COMPANY

603 Dublin Avenue, Columbus, Ohio

Send us complete 1941 plant data covering: ☐ Standard LOW-CHARGE Truck Mixers, Agitators. ☐ HIGH DUMP Truck Mixers, Agitators. ☐ Portable Hoppers. ☐ Auto Pavers and Spreaders. ☐ Pumps. ☐ Mixers. ☐ Hoists. ☐ Carts.

Name_____

Address_____

S AND AGITATORS THAN BY ANY OTHER METHOD

One of the most important links in a successful truck mixed concrete business is an accurate dependable batcher plant. A charging plant that accurately batches any given proportion, day after day, year in and year out will not only help keep you on the profit side of the business but will put you right in the front line for the 'Defense Contracts' that are being let every day.

Every year more of the nation's leading operators turn to Heltzel for dependable charging plants. During these years we have furnished plants ranging in capacities from 30 tons to more than 500 tons with 2, 3, or 4 aggregates with and without bulk cement facilities.

We have assembled and condensed this wealth of engineering data and specifications for truck mixer charging plants and have set up a versatile comprehensive line of standard plants that will fit any normal yard layout. This information has been clearly and concisely presented in our new Bulletin B-31.

No present operator of truck mixers, or one who contemplates setting up a truck mixer business can afford to be without a copy of this Bulletin. Send for your copy. There is no obligation.

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO, U.S.A.

Sharpen Your Selling Tools

Demonstration houses, home show exhibits, circulars, newspaper ads and other merchandising methods which have increased sales in 1940

By FRANK RICHTER

WORD OF MOUTH ADVERTISING may mean the very success of a product. Generally, this isn't as true today as formerly because of the power of other advertising methods. But for many products it still holds. Precast concrete products and ready-mixed concrete are two such commodities. In the home market for one, what a prospect's neighbor said of how this or that building material worked with him holds as much weight as what the contractor or architect may say. Also, the architect or contractor, to satisfy the prospect, in many cases will use what the prospect wants, or, he doesn't use it as long as the prospect will take something else quite as good.

This emphasizes the importance of a good reputation. Satisfied customers will continue using your product and also speak highly of it to others.

Building a good reputation can be helped by having a "certified" product. This can be done at small expense by employing an outside, independent agency to make regular tests. Your reputation also can be helped by a consistent, aggressive advertising program. The program's purpose should be to make the consumer concrete products conscious and at the same time to increase sales beyond the stage of incidental and accidental orders.

Personal salesmanship is undoubtedly the most effective way to sell such commodities as concrete products and ready-mixed concrete. But we know how much easier it is for the salesmen to clinch more sales when they *have* prospects and don't have to look for them and also when the prospects *know* about the products and are favorably inclined toward using them.

There are, of course, many devices and means of merchandising. All probably would prove successful to some extent if properly handled, but which will be the cheapest in proportion to results? A safeguard against investing in some type that will not pull as it should is to study the income, buying habits, reading habits and tastes of the market.

With a good knowledge of how the average persons in your locality live and what their habits and preferences are, some media can be selected which has the best chance of reaching the prospect when he is in his most receptive mood. Such information should also help in deciding who should be approached: the public, architects, contractors, or realtors.

Here's one way Chandler Materials Co., Tulsa, Okla., is taking advantage of sales it has already made to get more. The envelope contains 29 pieces. On one side of each is a good reproduction of some structure made of precast units and on the back side a description of the structure, its features, and a slogan. Then further action is stimulated by a post card, needing no stamp, which asks, "Do you want more information?"

As has been mentioned in several articles appearing in ROCK PRODUCTS about typical merchandising practices which are more than paying for the cost involved,* cleverly drawn up newspaper ads consistently run are an effective means of increasing sales and prospects. But whether this is an economical means of merchandising depends largely upon the circulation of the paper and also on the type of reader the paper reaches.

*See especially August, 1940, pp. 89-92; October, 1940, pp. 53-54 and December, 1940, pp. 77-79.

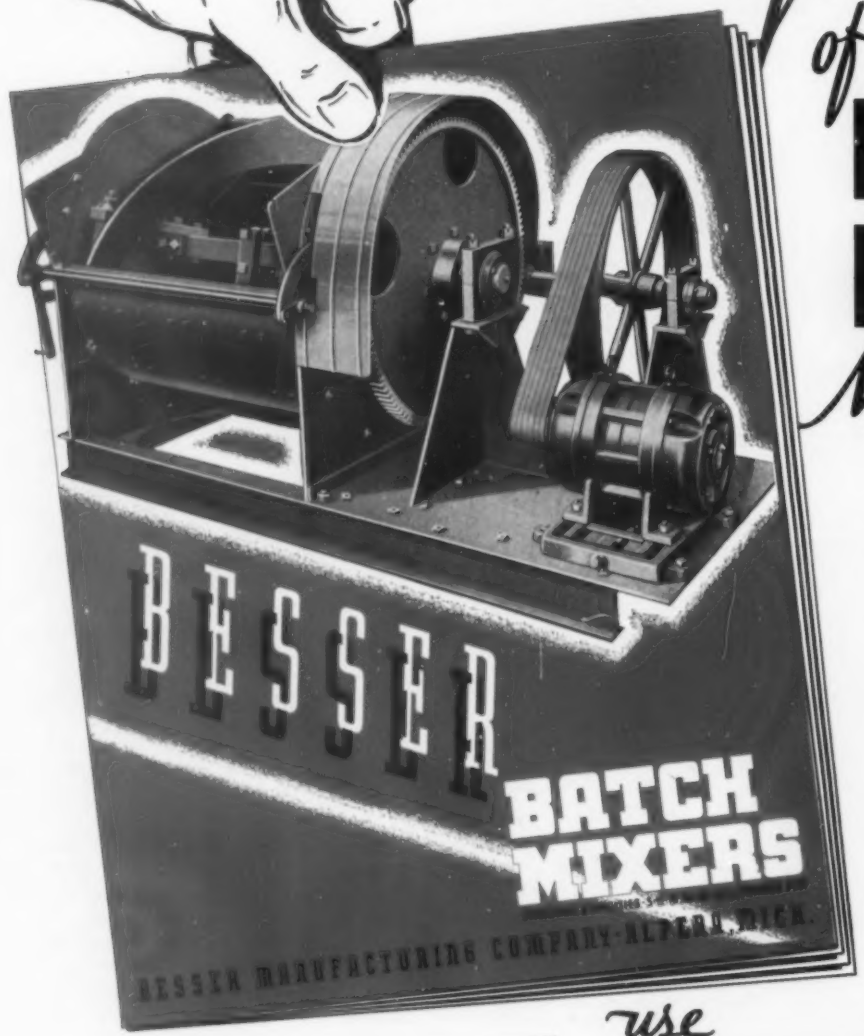
Capitalize on Public Interest in Housing

Throughout the country at present there seems to be more "own-your-own-home" consciousness than at any time in the last decade. It was unfortunate from a production standpoint that efforts to make concrete block standard for above grade construction began just about the time when the '29 building bubble burst. As a result the almost complete lack of building of any kind left the impression that concrete block could be used only as they were before 1929. What promotional effort most producers could afford was better spent for other markets than the home market. Consequently there are still many people considering building a house who do not know about the advantages of concrete masonry or about its adaptability to different styles of architecture.

Although the demonstration house is nothing new, the success a number of producers had with it during the past year shows its worth. Its advantages, of course, need not be discussed in detail. The buyer sees what he is going to get for his money. He is looking at your products in a very receptive mood. He can readily see what advantages there are in using concrete masonry. It is fire-resistant, termite-proof, damp-proof, has greater durability, is impervious to wind and rain, and is rot-proof. Any prejudice he may have against the use of block can be overcome by convincing testimony and an inspection of actual construction.

Demonstration houses have been built and publicized recently to take advantage of national advertising and promotion. As an example, producers in several cities with the cooperation of other organizations built houses that were adaptations of the 1939 "Bildcost" design created by architect Robert Charles Martin for

Here's Your Copy of the NEW BESSER Mixer Catalog



THE NEWEST IMPROVEMENTS IN MIXERS AND MIXER EQUIPMENT FOR CONCRETE PRODUCTS PLANTS FULLY ILLUSTRATED AND DESCRIBED.

Come to Hotel Sherman February 10-11-12 and Visit the Besser Exhibit, Booths 26 to 33, and See the Latest Concrete Products Plant Equipment. We will Be Glad to Welcome You.

use **BESSER** *Batch Mixers* for

Better Mixing
Easier Loading
Automatic Discharge
Easier Cleaning
Heavier Construction
Less Power

BESSER MANUFACTURING COMPANY • ALPENA, MICHIGAN

THE ORIGINAL TWIN SPIRAL BLADE BATCH MIXER

Better Homes & Gardens magazine. This was a Cape Cod style house having 6 rooms, full basement and attached garage. Precast block and joists were used, the block being painted with portland cement paint on the outside and plastered inside.

In Roanoke, Va., the house was built by a committee including: M. W. Ferguson, president of Cinder Block, Inc. of Roanoke, Va., Frank Lucas, president of the Roanoke Ready Mixed Concrete Corp., a builder, a realtor, and a banker. During a two-week demonstration more than 3000 people visited it, and as a result three similar concrete masonry houses were built and two new developments are under way. As a service and also a means of publicity, members of the Junior Women's Club of Roanoke acted as hostesses during the two-week demonstration.

In Indianapolis, Ind., one of the "Bildcost" houses, called the "Pot-of-Gold" house, successfully served as a demonstration. Cinder Block and Materials Co. coöperated with the builder and the savings and loan association in the demonstration. Invitations containing photographs of the house and others built in Indianapolis were sent to 12,000 families and an additional 1200 were sent by the Railroadmen's Federal Savings Loan Association to prospects from their files. During a two-week display Cinder Block and Materials Co. maintained a special wall and floor construction in the basement to show the structural qualities of the house.

Another "Bildcost" house was built in Lafayette, Ind., using precast units made by the Indiana Lockjoint Concrete Pipe Co., and during the few days it was on display more than 2000 people visited it.

A House Raffle

Interest in demonstration houses is being stimulated in a number of localities by raffling off the house as a climax to the showing. Tickets are sold at the house by civic groups and in stores for a nominal fee, say fifty cents. Such a disposal of the house appears to be costly. But it may pay for itself in newspaper publicity and for the number of people who come to see the kind of house they have hopes of winning. They and the names on the tickets—with the addresses of course—may prove fruitful as prospects for later circularization and sales.

In order that a demonstration have its maximum effectiveness it also must be merchandised. Free publicity can usually be obtained in newspapers, building magazines and stores and banks. As with the Roanoke "Firesafe Home," the various groups coöperating can give it publicity. If a department store furnishes the house, a tie-in with the demonstration could be made by a display in the store, as the department store is also desirous of drawing as many as it can to the demonstration. The local newspaper and also those in surrounding territories usually give publicity to such demonstrations.

In other words, every means possible should be taken to publicize the house. The object is to draw people for "live prospects." Hence, the more that come, the better is the house serving its purpose. Publicity should not be too gaudy or too blarey, because you don't want people who come just because they want to see a free show.

Several other precautions also probably should be taken. Too expensive a house should not be built for the subdivision or locality, and before construction is started it should be determined what type house will be within the economical reach of most prospects. Most demonstration houses are built to answer the means of people in the $3000 to $4500 range, but one survey has shown that the majority of home building prospects are in the $2000 to $2500 income bracket. Although this may not be true of your particular locality, it should be looked into before the house is built.

The public likes to be flattered into thinking it always gets more than it pays for; but because the purpose of a demonstration house is to sell houses, the prospective buyer shouldn't be given the idea he can get too much for his money. Our movies and "slick" home magazines invariably show houses that are far more expensive than the average home-buyer can afford. He pictures a new home; and his picture comes from these sources. So when he decides to build, he has to be eased into the revelation that he just can't afford to buy his "picture."

Develop the Farm Market

Demonstrations are also being used to expand the farm market; a fertile field for development and a natural for one of concrete's strongest selling points; that is, concrete's fire resistance qualities. One successful demonstration was of a dairy barn, built by A. P. Nelson of Spencer Cement Block Works, Spencer, Ia. He had publicized the showing in the same manner as with demonstration houses. The result was that he sold six more barns and increased his list of active prospects.

The principal features of the barn, which is 34x100 ft., are a concrete hay mow and floor and concrete roofs for two wings of the main barn. Precast joists were employed as the most practical and economical support for the mow floor, and precast block were used for the walls up to the hay mow floor. Anyone familiar with the fire hazard in most farm buildings can see what a potential market this represents, and Mr. Nelson's method of merchandising his units for this purpose already has worked out pretty well for him.

Home Show Exhibits

In many cities home shows have been so successful that they are being held as an annual event. This is one indication of the public's growing "home consciousness." Here the public can be familiarized with various applications of concrete products or

HIGH POINT of DISCHARGE
is a POINT of ADVANTAGE
Spouting Zenith
Ready Mixed Concrete
Over the Fence
Over the fence and directly into the forms, a Smith Mobile Mixer spouts Zenith ready mixed concrete. Nels Bergstrom of Bergstrom & Gustafson insisted on THE MIXER WITH THE HIGH POINT OF DISCHARGE. No other type would do. Smith Mobile Mixers are furnished when available, at no extra cost.
ZENITH DREDGE COMPANY
ESTABLISHED 1903
Bradley Building DULUTH Melrose 1903

Blotters mailed regularly suggest many features and applications of ready mixed concrete

Here's what you'll be doing—

AT THE

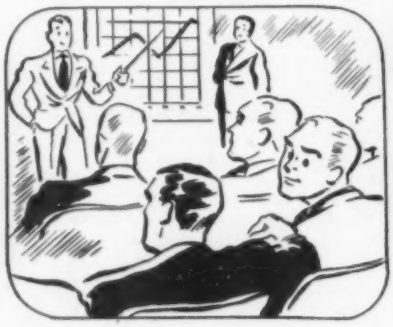
CONCRETE INDUSTRIES EXPOSITION

MEET OLD FRIENDS—the fellows who have been in the business with you for a long time—the fellows with many a valuable "tip" that hits close to your pocketbook. Here's a chance to get together with your customers—as well as competitors!

MAKE NEW FRIENDS—you can't have too many! Here you'll meet men who will be valuable business contacts as well as congenial company. Don't forget there'll be several thousand present—men whose business and social interests are the same as yours.

SEE THE LATEST. See the machines, materials, and methods that will make news in 1941! See the biggest array of cost-saving, profit-making machines for the concrete industries ever placed under one roof.

HEAR THE NEWEST in merchandising—in production—in construction—in research! Those after-dinner chats you'll have with men who know, will be invaluable to you in carrying a strong business policy to a successful conclusion in 1941.



ATTEND OPEN FORUMS. Be on the spot when the biggest men in the industry "argue it out" in intimate, vitally interesting open forum meetings where issues fundamental to your success will be discussed.

GET THE 1941 ANGLE. There are countless new "angles" which will be revealed and analyzed at the Concrete Industries Exposition. Get the "low-down" on them as they point directly to your success or failure to make a profit in 1941.

COME... SEE HOW IT'S DONE IN '41

CONCRETE INDUSTRIES EXPOSITION

CHICAGO

FEB. 10-11-12

THIS IS YOUR SHOW—BE THERE! Concrete contractors, concrete products and ready-mix men, home builders interested in the fast growing use of concrete and concrete products—general contractors, engineers and public officials—this is your show! Plan to attend!

HOTEL SHERMAN

Annual Conventions of the

National Concrete Masonry Ass'n.
American Concrete Contractors Ass'n.
National Cinder Concrete Products Ass'n.
Cast Stone Institute
American Concrete Pipe Ass'n.
Illinois Builders League

to be held concurrently with the Concrete Industries Exposition.

ready-mixed concrete, and prospects for later sales can be cultivated.

The purpose of such a show is to draw the maximum of those who attend. As attention drawers, moving objects and demonstrations usually succeed over the standard exhibits made up of photographs and samples. Various advantages of concrete products can be effectively demonstrated in this manner. A hot flame playing on a unit will show its fire resistance qualities. Water sprays can be directed against a treated panel, simulating the wall of a home. At certain periods during the show a demonstration wall can be laid up. Model houses can be featured, or movies can be shown of ready-mixed trucks operating on typical jobs. These and other ideas could be used to make an exhibit more popular than the average.

Other methods used to promote concrete products should emphasize the features that probably have the greatest appeal to your prospects. Small mailing pieces and blotters as well as small newspaper ads should dwell upon a single feature at a time. Seasonal timeliness or tie-ins with popular events are typical means of taking advantage of the public's knowledge and feelings.

Service Is Unseen Ingredient in Ready-Mixed Concrete

Where to advertise is a different problem for the ready-mixed concrete operator than the concrete products man. His purpose in advertising to the public is to reach those who need comparatively small amounts of concrete. For that reason the newspaper is often selected. It is the best means of reaching his customers who wouldn't know he existed unless they saw the ads on his trucks.

Different factors enter into merchandising ready-mixed concrete for the larger single order market. With contractors or architects, personal contact supplemented by direct mail, house organs, advertising specialties and circulars and blotters probably would be better. To them ready-mixed concrete is another building material needed as part of their structures. One sale should lead to others. Hence, merchandising directed at contractors and architects, bearing this in mind, should be a reminder that you are always ready to serve with quality and speed—that you're in business for their benefit.

Unlike the home building market or the burial vault market, efforts to sell ready-mixed concrete for

Impressing the public with the neatness of your trucks emphasizes the service feature of ready-mixed concrete. Operators of Stewart Sand & Material Co., Kansas City, Mo., trucks while waiting clean their trucks, keeping them in spick and span condition

foundations, basements, garage floors and driveways must be directed to a greater number of people. Each job usually must be sold to a different individual. Each may not amount to much, but in the aggregate represents a market worth going after. It calls for advertising copy suggesting where ready-mixed can be used and telling the advantages of ready-mix.

Who you want to reach and what is the best way to do it then always should be borne in mind. It will guide whether circulars, blotters, newspaper ads, or radio should be used and how the copy should be written It will be your guide to which of the tried and true means to use. By and large, successful merchandising in all fields today is being carried out with methods that are not at all new. And the methods, media and the way copy is written works as well in one field as in another. So with an eye to what others are doing in your field, and outside of it too, the all-important problem of how to merchandise should be put on the same basis as plant operation.

As to how copy can be made more effective, some producers are finding it profitable to call in the services of professional advertising agencies. Others who can not afford the expense can get valuable tips and supplementary information of a more extensive nature from the Portland Cement Association. It is constantly preparing new booklets and data about precast units which can be used in one part of the country as well as any other. Tying in your promotional material with their national advertising also works to your advantage as an indication that you are prepared to offer something being accepted throughout the country.

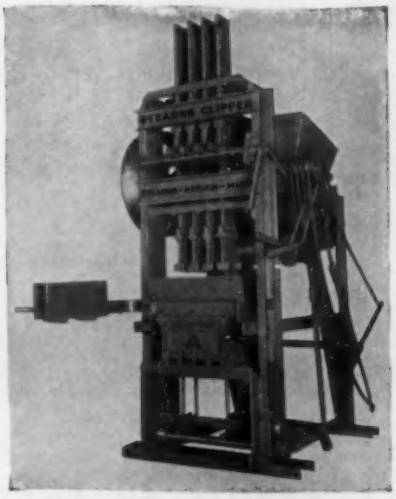
Recognizing that producers can always use good suggestions for newspaper ads, the Portland Cement Association has recently drawn up a brochure to aid in preparing copy. Specimen newspaper ads are reproduced and other publicity circulars available are described. Mats of the ads presented are available from the Association. From these mats printing plates can be made at a small cost.

Recently, three new booklets about concrete houses have been prepared by the P.C.A. and also are available at a nominal cost for distribution to your prospects. One is a 16-page booklet on "Suggested Designs for Small Firesafe Houses" and is presented to serve the low-price market. Another is called "Why People Like Concrete Homes," for use in the medium price class, and the third is called "Designed for Concrete." It can be used to point out the application and advantages of concrete masonry in the higher priced field. The last two booklets mentioned contain 32 pages each.

Cement Colors

STAR and ANCHOR COLORS

Geo. S. Mepham Corp., East St. Louis, Ill.
C. K. Williams and Co., Easton, Penn.



"ANCHOR"

Complete equipment for making concrete, cinder and other light weight aggregate units, including engineering service for plants and revamping of old ones for more economical service. Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers, Stearns Jolterete, Stearns mixers, pallets, Straublox Oscillating attachments, etc.

Repair parts for Anchor, Ideal, Universal, Stearns, Blystone mixers and others.

Anchor Concrete Mchy. Co.
G. M. Friel, Mgr. Columbus, O.

INFRINGEMENT NOTICE

To Builders and Users of Block Machines

Please take notice that the Stearns Manufacturing Company of Adrian, Michigan, are the sole and exclusive licensees of "Joltcrete" vibration block machine patents and patent rights and have the sole and exclusive right to manufacture and sell such equipment.

At the present time there is a suit for patent infringement pending against a New York concrete products plant (name given upon request), a user of infringing equipment. Others manufacturing infringing equipment and the users of such equipment will be prosecuted to the fullest extent of the law.

Louis Gelbman, Inventor
Suite 2001, 350 Madison Ave., New York, N. Y.

COMMERCIAL PRESTEEL PALLETS are die made, insuring uniformity and accuracy. They are designed to fit the machine. Ribs are pressed into the pallets to develop a stronger pallet and impart mortar grooves into the bottom of the units. With mortar grooves pressed into the top and molded into the ends of units—ribbed presteel pallets now make it possible to obtain a unit with continuous mortar grooves.

Write for illustrated catalog.

The COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN, OHIO

LOW INITIAL COST
LOW MAINTENANCE COST

Chase "all steel" Block racks are built to suit your individual requirements. Our experience and engineering will give you a rack with the proper dimensions and arrangement for loading your product and the proper under clearance to work with your lift truck.

WRITE
for Catalog and
Special Low Prices

Complete line of concrete block cars, decks, Lift Truck Racks, transfer cars, turntables, dump cars, etc.

CHASE DRYER CARS & TRANSFER CARS
CHASE FOUNDRY & MFG. CO. COLUMBUS, OHIO

New AS THE YEAR
The Revolutionary
KRAMER HI-SPEED TAMPER
CONCRETE BLOCK and BRICK MACHINES
on exhibit
CONCRETE INDUSTRIES EXPOSITION
Hotel Sherman, Chicago
February 10, 11, 12, 1941
Booths L87 and L94
Advance Inquiries Invited
KRAMER HI-SPEED TAMPER COMPANY
Peoria, Illinois

SURE
CONCRETE BRICK CAN BE MADE WITHOUT PALLETS ON THE
JACKSON CONCRETE BRICK MACHINE

Just Think What This Means in Dollars and cents saved in handling and upkeep as well as the cost of the pallets themselves.

Investigate today the most efficient and up to date concrete brick making equipment on the market.

JACKSON & CHURCH CO.
SAGINAW, MICH.

Ready-Mix Goes Cooperative

(Continued from page 113)

contractors and builders. Experts on concrete design and engineering usually are engaged to speak at these meetings and moving pictures of concrete construction are shown, plants are inspected and jobs of ready-mixed concrete are seen as part of the consumer educational program.

Many of the architects and contractors do construction work in several of the cities involved and thereby become acquainted in these meetings with the concerns from which they will receive concrete. For that reason it has been advisable to standardize operating practice and the general trade practice in all the cities, which is done through discussion and action at the meetings.

Promotional and advertising material, such as direct mail, radio and newspaper ads are discussed, ideas are interchanged, and the most effective ways are developed for each producer to handle his sales effort. Other things of mutual importance taken into consideration collectively are winter handling methods, concreting costs, truck licensing, operating cost data, delivery costs, specifications and other matters. Should any member attend any meetings, national or otherwise, of importance to producers of ready-mixed concrete, the membership gets the benefit of these discussions.

The secretary of the Association has a complete record of all the truck delivery equipment of each company; such as the make and capacity of the mixer drum, description of the truck chassis, the necessary clearance height to accommodate each type of equipment at the batching plant, etc., as a guide to the availability of delivery equipment to any plant needing more mixers temporarily for a given job.

Mixer trucks are interchanged on a rental basis. If an Appleton producer, for example, needs a 2- or 3-cu. yd. mixer and one is available in Green Bay, that mixer truck is rented to him on an hourly basis. The rental is $2.50 for a 2-cu. yd. mixer truck with driver and $3.50 for one of 3-cu. yd. capacity. Time is chargeable from the time the truck leaves the owner's plant until the job is completed in the other city, giving the renter free travel one way.

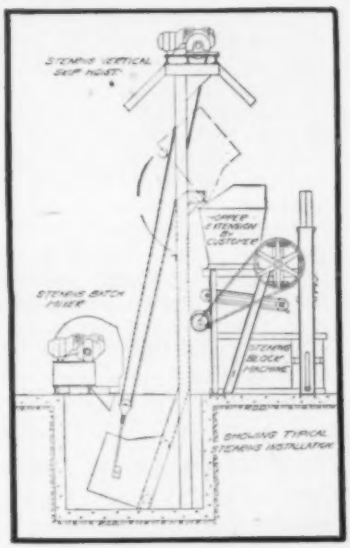
The Association has adopted a nominal additional charge for heated concrete. A concrete engineer has been employed for consulting and technical advice in its dealings with the consumer.

- Vibration
- Pressing
- Uniform Density
- Trowelled Surfaces

Write for Information

KENT-ROOT VIBRA-PRESS

The KENT MACHINE CO.
CUYAHOGA FALLS, OHIO



STEARNS

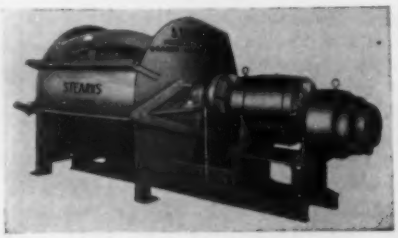
Skip Loaders cut costs in concrete products plants

in charging dry materials into elevated mixers or elevating mixed concrete to feeding hoppers. Independent and mixer drive types. May be used with any make of mixer. Proper track and cable lengths permit wide range of application.

STEARNS Batch Mixers

The mixer with the interchangeable, renewable, bar type liners of abrasion resisting steel. Pulley, V-Belt or Gear-Head Motor Drive. Skid or truck mounting.

Ideal mixers for concrete products and ready-mixed concrete plants.



Five sizes — 3, 12, 18, 28 and 42 cu. ft.

Complete concrete products plant equipment—block machines, hand and power—brick machines—mixers—skip loaders. Separate bulletins available on each machine.

STEARNS MANUFACTURING CO. - ADRIAN, MICH.
GENE OLSEN, PRESIDENT

Manufacturers of the famous Stearns Joltcrete Machines that make superior concrete masonry units by limited amplitude vibration.

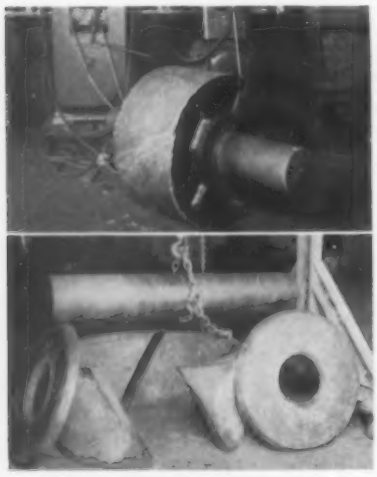
Hints and Helps

★ FOR SUPERINTENDENTS ★

Welding Trunnion Roller

AN EMERGENCY REPAIR on a rotary kiln trunnion was recently made for a cement plant by welding. The completed welding job and the component parts are shown in the accompanying illustration. The welded trunnion roller substituted for a heavy casting.

The heavy parts, shown in one of the views, were cut out and shaped, and then arc welded into the complete unit, using a G.E. 500-amp.



Above: Completed trunnion roller for kiln fabricated by welding. Below: Component steel parts

welding transformer and W-24 electrodes. Roller parts were made of boiler plate steel 2¼-in. thick. The fabricated and welded unit is 30-in. in diameter and weighing 2500 lb.

Emergency Sand Drier

DRY SAND was not a commercial product of the sand and gravel company located near Willow Glen, N. Y., but a telephone inquiry initiated a new product for the company. A considerable quantity of dry sand was needed for minor repairs on the locks of the New York State Barge Canal. The work was to be done with a cement gun.

All sand from the local bank was acceptable if it was dry. Prompt shipment was required, the sand to be bagged and delivered as required. The company quoted a price, received the order, and then proceeded to devise a method for the economical production of dry sand.

The equipment used in the drying process had to be immediately available, and a discarded horizontal tubular boiler was used as a drier. Two 12-in. square holes were cut in the top of the boiler to admit the sand into the usual water space. Four slots were cut in the bottom of the boiler as outlets. These slots were $\frac{3}{8}$- x 6-in. to pass ¼-in. sand. There were two slots under each intake, each slot being about 8-in. off center. A sheet iron plate was placed on the ground under the boiler to catch the dry sand and to form a shoveling platform. Cement sacks were used and filled by hand shovels. A runway permitted the use of wheelbarrows for loading the sand into the boiler.

No closing device was required for the bottom slots as the wet sand would arch and the dry sand would flow as a fluid. The top holes were boxed in with plank to form a hopper, which kept the wet sand from spilling and mixing with the dry sand.

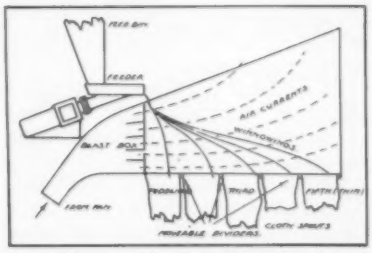
A wood fire supplied sufficient heat as the temperature could not be too high on account of the boiler tubes. An excessive heat would have had an adverse effect on the sand. A field test showed the sand to be absolutely dry when bagged. After standing in cement sacks for 72 hours, the sand showed a trace of moisture; and no more than a trace of moisture after the sand had stood in a shed for two weeks. The product was satisfactory to the contractors and to the inspectors on the barge canal.

Two men could dry and bag 10 cu. yd. of sand in eight hours. The following winter, dry sand, bagged, became a commercial product. It was used principally on slippery sidewalks.

Dressing Vermiculite

EXPANDED VERMICULITE has been finding increasing use as an insulation material in this country, and the methods of preparing the material are therefore of interest. A paper by J. E. Laschinger in the *Journal of the Chemical Metallurgical and Mining Society* of South Africa, describes the way the Palaboroa vermiculite of Transvaal is prepared.

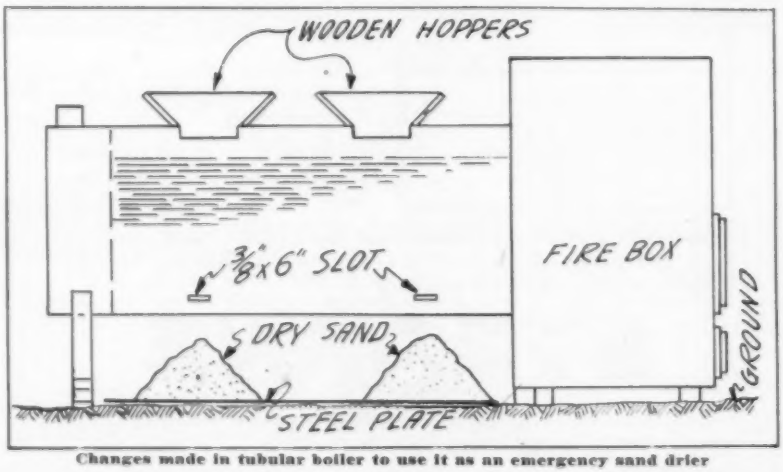
The South African vermiculite cleaves much more readily than American samples and there is much



Method of dressing vermiculite

gangue of low apparent specific gravity. The method of dressing shown in the illustration gives better results than ordinary pneumatic and drytable separation and makes possible close control of quality. Ore is dried if necessary, preferably by a steam drier, and screened through ½-in. sq. openings, oversize being reduced by a hammer mill. The material is then screened by vibrating or riddling square-mesh screens with openings covering the range of sizes to be produced.

Graded undersize consists of: (1) Vermiculite, from cubical lumps to thin flakes; (2) rocky ingredients, more or less rounded and equidimen-



Changes made in tubular boiler to use it as an emergency sand drier

sional; (3) flakes of gangue from interlaminated leaves of the vermiculite. This mixture is separated by winnowing as shown in the illustration, the material falling into a horizontal air blast of velocity varying from maximum at the inlet end to about 30 percent of this maximum 4 ft. downstream.

Middlings deposited near the entrance contain a considerable amount of vermiculite which can be recovered by a roll crusher or hammer mill treatment.

Thaw Out Plant With Locomotive

AT THE VAN SCIVER PLANT of The Warner Co., Philadelphia, Penn., a locomotive with an unusually long stack is used to thaw out the plant when it is necessary to operate during the winter months. The long stack on the locomotive, shown in the illustration, increases the draft and makes the boiler fire burn better.

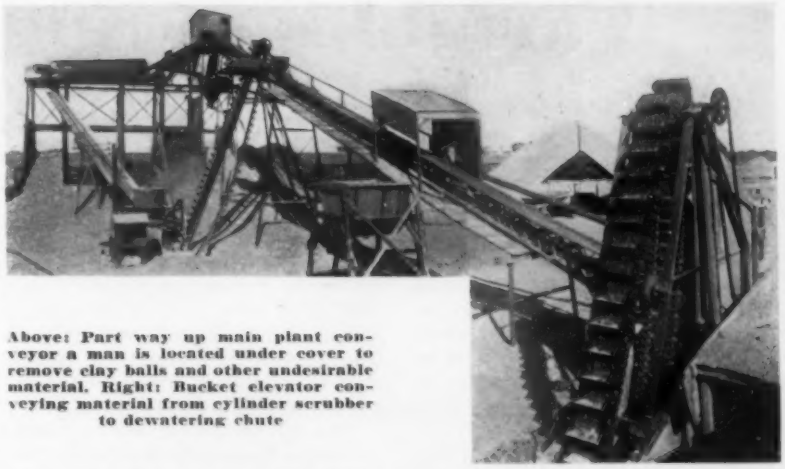
Steam from the locomotive boiler is piped up along the conveyor belts

Locomotive at the Van Sciver plant of The Warner Co., used for plant heating

within the plant to keep ice from forming on rollers and other machinery parts. Damage to the conveyor belt may occur if the rollers should freeze tight. The "high hat" on the locomotive stack was made from six old oil drums, states the *Warner-American News*.

Unusual Washing System

DU PRE SAND AND GRAVEL CO., Victoria, Texas, has a rather unusual plant set-up for washing which is shown in the illustration. A cylinder scrubber, not shown, empties into the hopper of the bucket elevator, to the right. The buckets dump the material into a dewatering chute which carries it to a belt conveyor, leading to the screening plant. Part way up the conveyor a man is stationed under cover whose job is to pick out any clay balls and other undesirable ma-



Above: Part way up main plant conveyor a man is located under cover to remove clay balls and other undesirable material. Right: Bucket elevator conveying material from cylinder scrubber to dewatering chute

terial and throw it in a pile below, where it is removed by a truck.

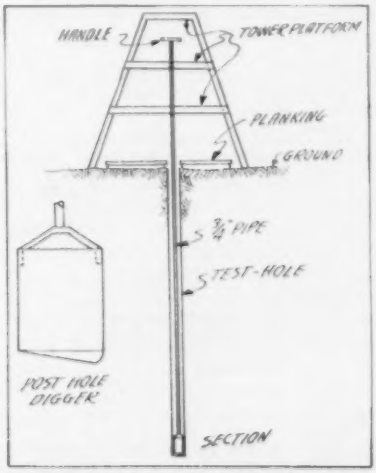
At the top of the plant is a desanding screen, the oversize going to a rotary sizing screen which separates out the different gradations desired. Larger rock rejected by this screen is chuted to an Allis-Chalmers gyratory crusher on the ground. The product of this crusher is returned to the main conveyor belt by another bucket elevator.

W. L. Du Pre is president, and J. C. Lockman is superintendent of the company.

Drilling Test Holes At Small Cost

FOR DRILLING TEST HOLES or wells in a sand deposit the rotary post hole digger may be used to advantage. This type of digger operates with a screw action having a sloped cutting edge on the bottom. By extending the shank with ¾-in. pipe, this digger may be used economically to depths of 50 ft. or more. Test holes may be drilled in soil free from boulders.

With a pipe coupling on top of the



Illustrating how post hole digger may be used for making deep test holes

shank, pipe may be added in 5 or 10-ft. lengths, thus extending the shank as the hole is deepened. The operating handle is moved to the top of each pipe section as it is added. A tower platform will facilitate operations by permitting the use of 10-ft. pipe lengths. If the location is isolated and lumber is not easily procurable, the platform tower may be built of saplings. At the top of the hole there should be a ground platform to prevent caving unless the ground is frozen at the surface.

By this method, holes may be dug to the ground water level. To continue the hole through the water bearing material to rock, it is necessary to case the hole; then the digging can be done with a sand pump or bailer. If the hole is to form a well, it will require a casing through all soil. For holes over 50 ft. deep some type of winch should be used for handling the sand pump in water and the digger in dry soil.

At first glance this set-up may appear to be slow, tedious and expensive, but it is economical for holes to 50 ft. in depth. Allowing a day for cutting and threading the pipe, a day for erecting the platform tower and three days for actual digging, plus a day for cleaning up and capping the hole and including transportation, the total cost of a 50-ft. hole is decidedly low. It is often possible to complete the entire operation in less time than it would take to haul and set up a well drill.

The ground water level may be determined with a well point, but that method does not produce any samples of the material that has been penetrated. This applies equally well to well drill operation. Of course, if a large number of holes are to be drilled amounting to several thousand feet, the post hole digger is outclassed by the well drill.

Variables of Sugar Test

Results of sugar solubility tests of portland cement depend on fineness of sample, storage conditions, and grinding procedure

By GEORGE WILEY*

SEVERAL recent specifications for portland cement have included the sugar solubility test, but the writer has always felt dubious about this test. In all fairness, however, he felt that it should be given a trial in order to determine some of the effects on the so-called solubility index.

After the necessary apparatus had been set up, the first thing that was done was to run the test on our regular product. Much to our surprise the index was way above the amount allowed in the proposed specifications, and this was, remember, with well burned clinker having a free lime content less than 0.50 percent.

CHEMISTS' CORNER

Reports of investigations in the rock products industries and comments on articles appearing in these columns are invited, as this is the purpose of the "Corner."

It was then decided to determine, if possible, some of the variables affecting the sugar solubility. For the purposes of all the tests that are to be described, a large sample of clinker was taken and all tests reported are on this clinker unless otherwise noted.

The first variable investigated was, of course, in burning. A small portion of clinker was taken and divided into two parts. One part was taken to the machine shop and melted to the complete liquid state with a welding torch and allowed to cool slowly. Both the reburned sample and the kiln sample were then ground down in a Braum laboratory pulverizer to surface areas shown in the table. It will be noted that the reburning reduced the free lime content slightly and reduced the sugar solubility only very slightly. As will be shown later this change in solubility could readily be accounted for by the difference in surface areas of the two samples.

Effect of Surface Area

The next variable to undergo investigation was the effect of fineness (indicated by surface area). At this same time another effect was also observed, namely, the effect of using TDA as a grinding aid. Two grinds were made in a laboratory ball mill charged with 20 lb. of clinker and 0.7 lb. of gypsum, and on the TDA run ⅛ of 1 percent TDA in 10 percent solution was also added.

It will be noted by an examination of the data and curve in Fig. 1 that the surface area has a very pronounced effect on the sugar solubility. The cements that would pass satisfactorily at surface areas below 2000 sq. cm. per gram would fail several times over at higher surface areas. However, the most amazing thing about these data is the difference between the solubility index of the clinker and the cement at approximately the same surface areas. The only difference in the two being the addition of gypsum to the cement.

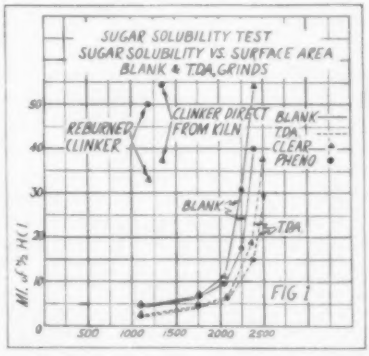


Fig. 1: Showing the relation of sugar solubility to surface area of ground clinker

It was thought that this difference might be caused by the moisture present in the gypsum; so test grinds were made with the addition of varying percents of water to the clinker just before grinding; 0, ½, 1, 2, and 5 percent water were added and then all samples ground to approximately the same surface area. The sample with no water added checked reasonably close with the earlier tests, Fig. 2. The sample with ½ percent moisture added drops to one of the lowest readings ever obtained in this laboratory. All of the samples with added water show low readings. The sample with ½ to 1 percent water showed a very normal and dry appearance after grinding. The 2 percent sample showed some evidence of moisture but

SUGAR SOLUBILITY TEST DATA

Number	Surface Area	Free CaO	Pheno	Clear		Remarks
1	1345	0.43	37.7	54.5		Clinker as taken from kiln
2	1180	0.35	33.0	50.0		Reburned clinker
3	1220	0.43	4.6	4.7		
4	1730	"	6.5	6.8		Ground in laboratory ball
5	2050	"	9.8	11.3		mill with gypsum
6	2255	"	17.3	31.3		No TDA
7	2405	"	40.2	54.6		
8	1115	"	2.5	2.5		Ground in laboratory ball
9	1720	"	4.6	4.8		mill with gypsum and TDA
10	2075	"	6.2	6.8		(⅛ of lb./bbl. in 10% solu-
11	2375	"	15.0	19.0		tion)
12	2510	"	29.4	37.8		
13	1300	"	37.2	50.5		Clinker without gypsum
14	1350	"	6.7	7.4		Clinker with gypsum
15	1300	"	34.6	50.0	0	
16	1250	"	3.0	3.1	½	Clinker interground with
17	1275	"	3.3	3.3	1	varying amounts of wa-
18	1300	"	3.9	3.9	2	ter. Figure gives % by
19	1250	"	5.6	5.9	5	weight
20	1325	"	35.4	51.0	0	Ground clinker. 100
21	1325	"	2.7	2.8	½	grams in quart can with
22	1325	"	3.3	3.4	1	moist filter paper in up-
23	1325	"	4.2	4.3	2	per part of can. Number
24	1325	"	5.6	5.9	5	indicates % moisture in paper.

*Assistant superintendent, Nebraska Cement Co., Superior, Nebr.

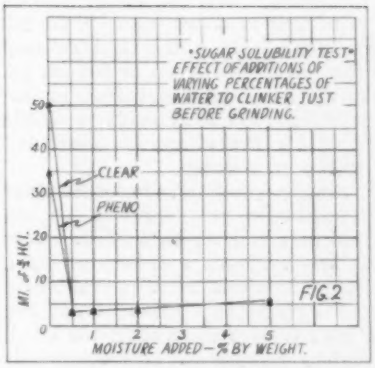


Fig. 2: Graphs showing the effect of adding varying percentages of water to clinker just before grinding

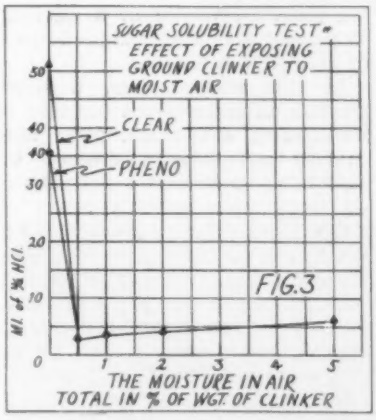


Fig. 3: Shows the effect on sugar solubility test of exposing ground clinker to moist air

not obvious to casual inspection. The 5 percent sample was noticeably damp.

Effect of Adding Water

It was then decided to see if the method of introduction of water would have an effect on the solubility index. Five 100-gram portions of this ground clinker were placed in one quart friction top cans and two filter papers suspended in the upper part of the can. Water was placed on the filter paper in the following amounts: 0, ½, 1, 2, and 5 percent by weight. After 48 hours the cans were opened, inspected, and a sugar solubility test run. The samples, Fig. 3, with ½ and 1 percent water showed no evidence of caking or lumping. Sample 2 percent had a slight caking on the surface of the cement which was easily broken up by screening. Sample 5 percent was caked completely through the layer of ground clinker, but could be broken up by screening. Here again the introduction of moisture has a very pronounced lowering of the sugar solubility index.

One other variable remains to be investigated and that is the effect of aging. These samples are being retained and tests will be made from time to time to determine the changes produced by aging.

Conclusions

1. It is shown from these tests that other things than burning have large effects on the results of the sugar solubility test.

2. The results of the test depend to a large extent on the fineness of the sample.

3. The introduction of small amounts of water to the grinding will effect a decided lowering of the solubility index.

4. Storage of cement in moist atmosphere will effect a decided lowering of the solubility index.

It is the opinion of this writer that the test for underburning by the proposed sugar solubility test is not practical because of the above stated conclusions which in all cases have a much greater effect on results than any reasonable variation in burning operations.

Defend Merriman Sugar Tests

By N. T. STADTFELD**

REFERENCE is made to an article in ROCK PRODUCTS of October, 1940, entitled, "Oxides Extracted in Merriman's Test of Portland Cement," by E. P. Flint and P. H. Bates.

With proper respect to the work of the authors in regard to the thoroughness of the investigation concerning the oxides extracted in the sugar test for portland cement, there are certain deductions in the article which must not be left unchallenged. The statement is made that the sugar test in five of the six cases investigated, with and without the addition of gypsum, cannot be considered as an indication of the degree of clinker burning. The reasoning leading to this statement is based on the premise that "it would not be likely that the presence of the gypsum alone should produce such a marked reduction of titration values and the reduction in the dissolved oxides".

The action of the mechanical mixture of gypsum with clinker is an unsolved mystery in respect to its influence on setting time, soundness and early strength, and its influence on the sugar test results need be no exception. It is therefore to be regretted that if a deduction of this kind were contemplated by the authors, they did not include in their investigation the simple procedure of observing whether the clinker obtained was hard-burned or otherwise.

It was the contention of the late Mr. Merriman for many years that while large sums were being spent on investigating cement in the laboratory, very little was being done in coöperation with manufacturers at the production end and in almost all cases the history of the clinker used in the tests was unknown. Observation at cement mills, carried on for a period of three years and more, leads me to this positive and incontrovertible statement: that for cement within certain chemical limits, the sugar test does indicate degree of burning. In all fairness, it should be stated that the test is definitely tied up with other requirements in the Board of Water Supply, City of New York specification. (See ROCK PRODUCTS, January, 1938.) They call for kiln temperature control, a low alkali content, a minimum silica of 21.5%, a maximum alumina of 5.60%, and an alumina-over-iron ratio of 1.20-1.60, to name the more important ones. The test is not applicable to high-early strength cement which is notably hard-burned in order to be sound, but overlimed, or to white cement which, according to the authors' sample, contained 5.1% of free lime.

It is also doubtful whether any cement with a much higher alumina and higher alumina-iron ratio than specified, could easily pass the test even when hard-burned. But within the limits stated, one need but look through kiln temperature record sheets, of which there are now many thousands, to become convinced that the temperature is definitely considered by the producer as an index as to what is to be expected in the sugar test results. A drop in temperature for a period of time of half an hour or more, either causes the remark on these records, "clinker sidetracked from Board of Water Supply storage" or leads to the rejection of a bin; the latter occurs very infrequently as in all the ten plants where this cement is now being made to a combined total of 350,000 bbl. per month, control is exercised to a marked degree at the business end of the kiln. All producers are convinced that thor-

**Division Engineer, Board of Water Supply, City of New York.

ough burning is a pre-requisite for the passing of the sugar test. They have installed, in a majority of cases, a high heat resistant lining in the burning zone.

In addition, results of an experiment carried out at one of the mills, where temperatures of the burning zone were carefully controlled, should dispel all doubt as to the relation between sugar test and burning temperatures. On several successive days the normal product of this plant was made, the only variable being kiln temperature. This was varied until the maximum difference was 135 deg. F. Cement made from clinker obtained at the highest temperature showed a sugar solubility of 2.1, that at the lowest, 56.0. This evidence is not easily refutable.

While this should close the discussion of the subject matter, permit me to mention one more point which has been brought up many times and that is: "Is it necessary to burn so hard consistently to obtain durable concrete?" This question must be faced and answered honestly. The fact is that due to the genius of the late Mr. Merriman, the Board of Water Supply specifications were written; cement made in accordance with them forms a concrete with every indication of durability; it is rock-like in its appearance, rich in amorphous substance, free from laitance and chalky matter—a monument to his name. Of this we are convinced, and so are other investigators. It no doubt contains a factor of safety, the extent of which is unknown. Engineers in designing reinforced concrete allow 1000 p.s.i. for concrete, showing 4000 p.s.i. in 28 days; allow 20,000 p.s.i. for steel with an elastic limit of 40,000 p.s.i.; use working stresses in manganese bronze of 4000 p.s.i. where the elastic limit is 32,000 p.s.i. Why should a factor of safety not be allowed for the quality of a product which is so all-important in construction work?

A Rebuttal

By P. H. BATES*

MR. STADTFELD has raised the question of the character or degree of burning of the clinker in the paper on "Oxides Extracted in Merriman's Test of Portland Cement." Clinkers "H" and "J" were very well burned hard clinker. The others would possibly not qualify other than well burned clinker.

From Table 1 of the paper it will be noted that cements prepared from these two clinkers without the addition of gypsum during the grinding yielded in both cases a product that would not pass the sugar test. But one of these, namely, "H", when ground in the presence of gypsum yielded a quite satisfactory cement, whereas the other was still unsatisfactory.

Mr. Stadtfeld comments on the fact that the test is not applicable to high early strength cement. However, cement "E" is a high early strength cement and was well able to pass the Merriman test.

It is also to be noted that all of the cements which did pass the sugar test fell without the alumina-iron ratio which is used in the specification of the Board of Water Supply.

*Co-author with E. P. Flint of the article, "Oxides Extracted In Merriman's Test of Portland Cement."

New Materials For Defense

(Continued on page 49)

ment. In one instance, requiring upwards of 250,000 tons of sand and gravel, the contractor has set up his own batching plant at a Naval base to batch out ready-mixed concrete. In this case, the producer built an entire new sand and gravel plant close to the site, since local production was insufficient and the site too far for shipment from his other plants. This plant was operating on a 20-hr. day, delivering to the job and stockpiling to carry over when temperatures dropped below 15 deg. F. or 20 deg F.

Another producer of both sand and gravel and ready-mixed concrete is serving three simultaneous jobs totalling over 125,000 cu. yd. of ready-mixed concrete from one permanent batching plant centrally located. His hauls in transit mixers run from 12 to 20 miles. Nine new transit mixers of 5- and 6-cu. yd. capacity were purchased to handle the job.

Other permanent operators have had to purchase additional delivery equipment but have established batch plants near the job sites in order to eliminate the purchase of too much equipment which could not be possibly utilized in normal business channels upon completion of the contract. Some truck operators are required to do all their mixing at the job, others are permitted to travel at agitating speed to be followed by mixing at the job and some mix in transit entirely. Many plant operators have started delivery to the jobs during their normal off-season and thus are able to divert truck equipment to the job sites, which equipment would otherwise remain idle. With resumption of regular business in the Spring, and with new contracts breaking then in different locations, some of these companies will be short-handed in truck mixer delivery equipment. Experience in some cases has been that a ready-mixed concrete operator has been requested to be able to deliver say, 125 cu. yd. of concrete in a day and actually has had to deliver up to 500 cu. yd. In these instances, additional appropriations have been made to double or treble the expansion while the work is in progress.

Another producer, of crushed stone and ready-mixed concrete, has two contracts and separate batch setups at two locations and is utilizing a paving machine as a central mixer and hauling to the job in flat bed trucks to save purchasing too much moving equipment. This concern is delivering 166,000 tons of railroad ballast to an army arsenal at the same time and will operate its crushing plant all Winter at a capacity 40 percent over a normal production of 2800 tons in 8 hours.

In still another case, a large operator of ready-mixed concrete is transferring a batching plant and delivery equipment a distance of 1000 miles to furnish a 200,000 cu. yd. ready-mixed concrete order.

One stone crushing plant that we know of was situated close to a cantonment and, without any substantial warning, was called upon to furnish crushed stone for a sub-base on road construction at rates of as high as 2000 tons daily. This plant will operate all winter in northern country where temperatures of 20 deg. F. to 30 deg. F. below zero are common.

Winter Operating Difficulties

Winter operation has had its adverse effect. Sand and gravel operations cannot go on much below freezing temperatures, but plants are operating at as low as 15 deg. F. During very cold weather, operation is suspended to resume just as soon as the contractor notifies the producer that he is pouring concrete. This condition, which also holds for ready-mixed concrete, leads to a rapid turnover of labor.

All the batching plants set up near job sites are equipped for heating mixing water and many have facilities in heating aggregates. Others are installing heating coil and jet equipment as the season progresses. While specifications limit the pouring of concrete during cold weather, much of the work is inside for pouring floors, etc., and the use of high early strength cement, calcium chloride, salamanders and tarpaulins permits pouring under conditions not normally met on a large scale by a producer. Freezing and thawing conditions at some of the job locations make travel in trucks loaded with concrete impossible except with modern, powerful trucks.

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Cement Company Files Suit

THE PERMANENTE CORP., Santa Clara county, Calif., has filed a $25,000 lawsuit against the Western Pipe and Steel Co. for damages sustained by the collapse of a 400-ton steel bin. Faulty construction was claimed by the cement company, which asks $15,000 for damaged machinery and expense of removal, $5000 for delays to production and $5000 attorney fees. A workman was injured in the accident.

$250,000 Improvements

ALPHA PORTLAND CEMENT CO., Ironton, Ohio, plant, has been closed down for a three months' period during which $250,000 will be spent for improvements. Four of the six kilns at the plant are to be enlarged and unit coal mills will be installed as part of the program of modernization.

Object to Dredging

SEABOARD SAND AND GRAVEL CO., New York, N. Y., has applied for a permit to dredge in the Mount Sinai Harbor off Long Island, but the application was protested by residents and property owners in the vicinity. Col. Dillon of the War Department heard the protest and told property owners that in studying such applications, the War Department excludes all considerations except those that might affect navigation.

Retail Aggregates Plant

GRANT-PACIFIC ROCK CO., Fresno, Calif., has completed a new retail plant at Reedley, Calif. on property leased from a railroad so that aggregates can be taken from cars direct into storage bins of 500 tons capacity. The company also has a branch plant at Selma, Calif., and specializes in ready-mixed concrete. Willie Dobkins is manager of the new plant.

Stone for National Defense

QUARTZITE STONE CO., Lincoln, Kan., recently contracted its entire output for ten days, the crushed stone to be shipped to Camp Funston near Fort Riley. Barracks and roads are under construction.

Build Large Capacity Ballast Plant

UTAH SAND & GRAVEL CO., Salt Lake City, Utah, recently placed in operation a large ballast plant at Evanston, Wyo., with a capacity of 750 tons per hour of plus $\frac{3}{8}$-in. and minus $1\frac{3}{4}$-in. material. All minus $\frac{1}{4}$-in. is wasted. Operation is dry.

As only one size material is produced, the flow of the plant is very simple. Cars are loaded under storage tanks by two 24-x24-in. S-A Moore bin gates. Stephens-Adamson Manufacturing Co., designed and detailed all the steel work, and furnished all machinery, belt conveyors and the spouts and transfer chutes. H. K. Herrick, engineer for Stephens-Adamson, was in charge of erecting the plant.

Governor Plugs for Cement

KANSAS STATE INDUSTRIAL DEVELOPMENT COMMISSION is to be asked by Governor Ratner to file a protest with the U. S. War Department concerning discrimination against the use of Kansas-made portland cement on a nine-mile stretch of road at Fort Riley. Recently plans were changed from cement to Kentucky rock asphalt construction.

$50,000 to Improve Plant

SIGNAL MOUNTAIN PORTLAND CEMENT CO., Chattanooga, Tenn., is spending $50,000 to improve plant operating efficiency. The program will consist of rebuilding and combining two kilns into a single kiln 366 ft. long. Capacity of this plant will remain the same. Announcement of the expenditure was made at a recent meeting of the board of directors.

Discontinues Operation

CRYSTAL LIME CO., Elsberry, Mo., has discontinued business after 40 years of operation.

Large capacity ballast plant which will furnish ballast material for the Union Pacific Railroad. Note unusual chute arrangement at the ends of vibrating screens which feed conveyor belt

The Hardest-Working Trucks in America!

Dual wheels and heavy duty tires as shown at slight additional cost.

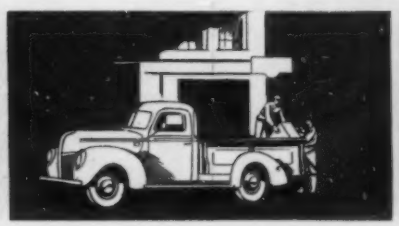
FORD TRUCKS *are on more jobs today than any other truck.* More Fords are in use by actual registration. There are Fords in nearly all of the nation's biggest fleets. What do these *facts* indicate? Just this: Large and small operators are entirely satisfied with the *high efficiency* at *low cost* of Ford hauling equipment. There are Ford units for practically all America's trucking jobs. There's one for yours. Without cost or obligation, call any Ford Dealer for an "On-YOUR-Job" Test.

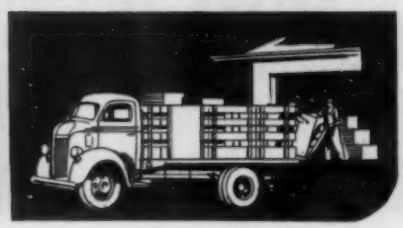
* * *

Three engines: 95 and 85 hp V-8—new 30 hp 4-cylinder economy engine for light duty. Six wheelbases — 42 body and chassis types.

FORD TRUCKS

AND COMMERCIAL CARS





NAYLOR LIGHT-WEIGHT PIPE MAKES LIGHT WORK OF DREDGING OPERATIONS!

Here's the pipe for dredging operations that combines the economies of light weight with structural strength, leak-tightness and safety not found in any other light weight pipe.

Experienced sand and gravel operators know that Naylor's exclusive Lockseam Spiralweld enables this pipe to carry loads usually requiring heavier wall pipe. High pressure or low pressure service—Naylor Pipe is built to take it, with a safety feature in the lock-seam construction that provides a continuous expansion joint throughout the line.

This versatile service plus the savings in transportation and handling provide the solution to your dredging problems. Sizes from 4" to 30" in diameter. Special connections and fittings for dredging service.

Write for Naylor advantages or send specifications for quotation.

NAYLOR PIPE COMPANY
1237 EAST NINETY-SECOND STREET
CHICAGO, ILLINOIS

NAYLOR LOCKSEAM SPIRALWELD PIPE

Cross

PERFORATED PLATES AND SECTIONS

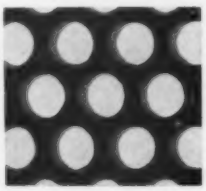
FOR VIBRATING AND ROTARY SCREENS

MADE OF CROSS SPECIFICATION STEELS

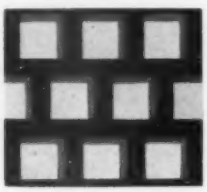
CSA. CM5.

WITH CROSS ENGINEERED WORKMANSHIP GIVE HIGH PRODUCTION + UNIFORM SIZING + LONG WEAR = LOWEST PER TON COST

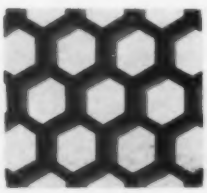
TYPES OF PERFORATIONS



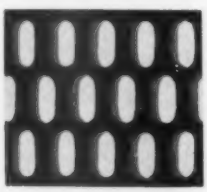
CROSS ROUND PERFORATION
—Most accurate and uniform sizing, due to equal width in all directions.



CROSS SQUARE PERFORATION
—Commonly used for somewhat greater percentage of opening and capacity than Round.



CROSS HEXCREEN PERFORATION
—Combines the accurate and uniform sizing of Round with greater capacity than either Round or Square. Product meets test with either Round or Square sieve.



CROSS SLOT PERFORATION
—Special conditions, when large capacity is of primary importance.

You will find in our complete line, the BEST SCREENS for present day problems.

Write for illustrated literature.

CROSS ENGINEERING COMPANY
Main Office & Mfg. Plant, Carbondale, Penna.
Sales Agencies in Principal Cities

FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

Arundel Corp.	$ .25	Dec. 28
Arundel Corp., extra	.50	Dec. 28
Bessemer Limestone & Cement Co. (arrears Dec. 31, 1940, $1.50)	6.00	Dec. 20
Consolidated Sand and Gravel Ltd., Toronto, Ontario (arrears Dec. 18, 1940, $40.50)	3.50	Dec. 20
Eastern Magnesia Talc Co.	1.00	Dec. 20
Florida Portland Cement Co., pfd. (arrears Dec. 21, 1940, $71.75)	7.00	Dec. 20
Idaho Portland Cem. Co.	3.00	Dec. 20
Ideal Cement Co.	.35	Dec. 21
Ideal Cement Co., special	.35	Dec. 21
Kelley Island Lime & Transport Co.	.25	Dec. 14
Lehigh Portland Cem. Co.	.37½	Feb. 1
Lone Star Cement Corp.	.75	Dec. 23
Lone Star Cem. Corp., yr.-end	.50	Dec. 23
Longhorn Portland Cem. Co.	1.00	Dec. 14
Missouri Portland Cem. Co.	.75	Dec. 20
Monolith Portland Cem. Co. (arrears Dec. 17, 1940, $2.55)	.50	Dec. 16
National Gypsum Co.	.40	Dec. 26
New York Trap Rock Corp.	.20	Dec. 28
New York Trap Rock Corp., pfd.	1.75	Jan. 2
Pennsylvania Glass Sand Co.	1.00	Dec. 16
Petoskey Portland Cem. Co.	.30	Nov. 1
Superior Portland Cem. Co.	.82½	Dec. 24
Yosemite Portland Cem. Co., pfd.	.05	Jan. 2

PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., had a profit of $79,791 for the nine months ended September 30, 1940, after selling and administrative expense, general expense, depreciation and depletion, but before provision for federal income tax. This compares with a loss of $14,276 for the corresponding period in 1939. The principal factor in the improved showing of this company was an increase of 8.6 percent in sales, largely accounted for by the defense construction program. A modernization program, involving expenditures of $850,000 over a period of three years and now nearing completion, has resulted in the relatively low cost of operation. The consolidated statement of earnings and sales for the nine-month period ended September 30 follows:

	1940	1939
Sales	$1,402,167	$1,291,218
Cost of sales	1,036,235	1,033,588
Profit on sales	$365,932	$257,630
Other income (net)	30,977	39,903
Total income	$396,909	$277,533
Selling and administrative expense	170,915	185,391
Depreciation and depletion	146,203	126,418
Profit	$79,791	*$14,276

* Loss.

ARUNDEL CORP., BALTIMORE, MD., reports a profit of $970,177 for the 11 months ended November 30, 1940 as compared with $1,245,628 for a similar period in 1939. This company has some large defense construction contracts.

PENNSYLVANIA GLASS SAND CORP., Lewistown, Penn., had a net profit of $589,221 for the nine months ended September 30, 1940, after federal income taxes under the Second Revenue Act of 1940. The net profit for the corresponding period in 1939 was $378,270.

•

NORTH AMERICAN CEMENT CORP., New York, N. Y., reports for the 12 months ended September 30, 1940, net loss of $415,664, after taxes, depreciation, depletion and interest, but before profit on bonds purchased, against a net loss of $439,875 for the 12 months ended September 30, 1939.

There Is
Extra Profit
In Its Plus Value

Use "HERCULES" (Red-Strand) the next time you re-rope. You will soon discover the definite advantages of the Leschen manufacturing policies and methods, which leave nothing to chance. From the initial selection and tests of its materials, to the final inspection of the finished rope, each manufacturing detail is rigidly checked to assure long operating life.

Measure the extra value of "HERCULES" (Red-Strand) Wire Rope by the yardstick of performance. It will bring you extra profit, as well as help speed up your work. With wire rope, it pays to use the best.

Round Strand — Flattened Strand — Preformed

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS — ESTABLISHED 1857
5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U.S.A.

NEW YORK 90 West Street
CHICAGO 810 W. Washington Blvd.
DENVER 1554 Wazee Street
SAN FRANCISCO 520 Fourth Street
PORTLAND 914 N. W. 14th Avenue
SEATTLE 3410 First Avenue South

Calaveras Stymied on Natural Gas

CALAVERAS CEMENT CO., San Francisco, Calif., has increased by about 50 percent its royalty offer for a proposed pipeline easement into the Rio Vista gas field in California. California State Lands Commission will consider the proposed contract which representatives of the company estimate will yield $92.50 a day to the state. The company had previously executed an easement with the state reclamation board for a right-of-way through land held by that agency and proceeded to build a $300,000 pipeline to furnish gas for operation of the cement plant at San Andreas, Calif. The Commission later rejected the company's application for an easement over other state land after Standard Oil Co. of California and others insisted the Calaveras gas well would drain state-owned gas on which Standard Oil Co. holds lease rights.

Installs Dust Collector

WASHINGTON-IDAHO LIME PRODUCTS CO., Orofino, Idaho, is installing a Western Precipitation Corp. Cottrell electrical precipitator to recover upwards of 95 percent of the stack dust. The dust is to be returned into the raw materials.

Why cost-minded producers are installing *Simplicity* gyrating screens

There's nothing mysterious about the outstanding sales success of Simplicity gyrating screens in the aggregate industry. Producers are simply comparing first costs, depreciation costs, maintenance costs, and production speed of Simplicity units. And they soon see that Simplicity's give them by far the greatest value for their money.

Simplicity screens offer you a wealth of outstanding features including: Counterbalanced eccentric shaft; rubber-mounted screen corners, screens in four-way tension over doubly crowned surface, dust-sealed Alemite lubricated roller bearings; extra rugged construction.

You, too, will find that Simplicity gyrating screens will help you whittle down your processing costs, help you maintain greater production schedules. Write today for complete facts.

Right: A 5'x 12' Model D double deck Simplicity gyrating screen.

Simplicity

ENGINEERING COMPANY · DURAND MICH.

Ready Mix for Ship Yards

BOSTON SAND AND GRAVEL CO., Boston, Mass., is to furnish approximately 100,000 cu. yd. of ready-mixed concrete for construction at the Fore River shipyard of the Bethlehem Steel Co., Quincy, Mass., which will consist in part of the construction of ship building ways and docks for large cruisers. A central mixing plant is to be built to mix the concrete for the Foundation Co., New York, N. Y., construction contractor.

The sand and gravel company is also delivering concrete from its Boston plant to the Boston Navy Yard for miscellaneous construction, in the neighborhood of 10,000 cu. yd.

Large Tonnage of Ready Mix for Aircraft Plant

GRAVEL PRODUCTS CO., Buffalo, N. Y., producer of sand and gravel and ready-mixed concrete, is delivering over a 9-mile haul from its plant at Tonawanda, N. Y., 12,000 cu. yd. of ready-mixed concrete for construction of the Bell Aircraft Corp., plant at Niagara Falls, N. Y.

Three new truck mixers were purchased increasing the company's fleet to 23. Nine are required for the contract, all of which are 3- and 4-cu. yd. Jaeger mixers on Mack trucks. Maximum requirements are for delivery of 300 cu. yd. a day, with completion expected in March, 1941. Contractor is the Austin Co.

Sand-Lime Brick Production and Shipments

ELEVEN active sand-lime brick plants reported for November and eleven for October, statistics for which were published in December.

AVERAGE PRICE FOR NOVEMBER

	Plant Price	Delivered Price
Detroit, Mich.	....	$14.50
Grand Rapids, Mich.	....	14.00
Milwaukee, Wis.	$10.00	12.00
Mishawaka, Ind.	10.50	....
Seattle, Wash.	14.00	16.00
Sebewaing, Mich.	10.00	....
Syracuse, N. Y.	14.00	16.00 C /L 20.00 L /C

STATISTICS FOR OCTOBER AND NOVEMBER

	†October	‡November
Production	3,349,245	2,813,600
Shipments (rail)	197,800	97,000
Shipments (truck)	3,647,092	2,477,112
Stock on hand	1,398,499	1,443,374
Unfilled orders	1,900,000	900,000

†Eleven plants reporting: incomplete, one not reporting production, two not reporting stock on hand and five not reporting unfilled orders.

‡Eleven plants reporting: incomplete, one not reporting production, two not reporting stock on hand and six not reporting unfilled orders.

Batching 1000 Miles From Headquarters

U. S. TRANSIT MIX CONCRETE CORP., subsidiary of the McCormick Transit Mix Concrete Co., New York, N. Y., has the distinction of locating a batching plant about 1000 miles from its headquarters to fill a defense contract of about 200,000 cu. yd. of ready-mixed concrete.

A batching plant of 200-cu. yd. capacity per hour has been shipped into Illinois near Wilmington to deliver transit-mixed concrete to the Elwood Ordnance and Kankakee Ordnance plants under construction by the War Department. Stone and Webster Engineering Co. and Sanderson and Porter Co are the contractors. Deliveries to both projects are to be made in 20 to 25 transit mixers (5 cu. yd.) also shipped from New York City. Chicago Gravel Co., Chicago, Ill., is to furnish the aggregates from its Rockdale plant.

Booklet Describes A Century of Service

NEWARK PLASTER CO., Newark, N. J., with the year 1940 began its second hundred years as probably the oldest concern in the rock products field now doing business. Upon the occasion of its 100th anniversary a 20-page illustrated booklet in color was distributed. It contains a brief history of the company and presents the complete line of Newark gypsum and plaster products, the sizes available and uses for each.

New Concrete Pipe Plant

COLUMBIA CONCRETE PIPE CO., Wenatchee, Wash., has built a new plant at Okanogan, Wash., to manufacture culvert pipe, irrigation pipe, concrete brick and block. Ready-mixed concrete will be added in the spring. A gravel pit near the site has been developed, and a washing plant installed to produce the aggregates.

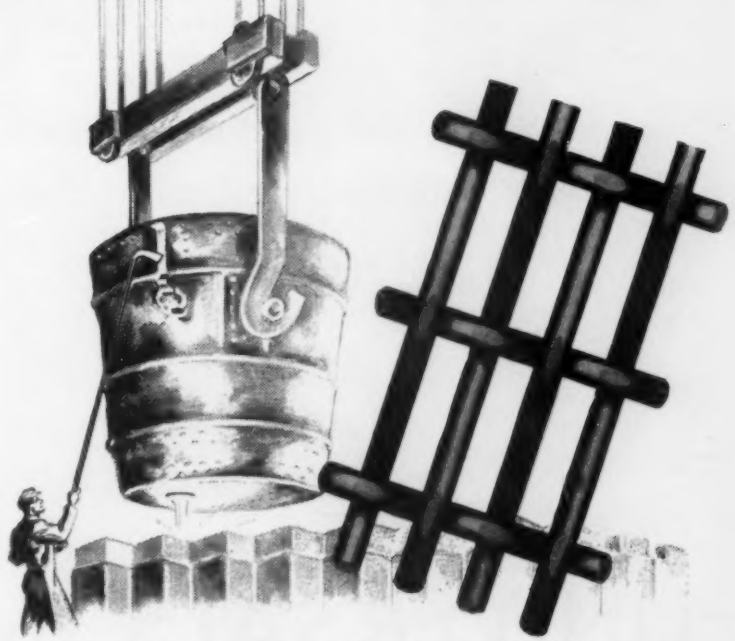
Complete Grand Coulee Contract for Cement

LEHIGH PORTLAND CEMENT CO., Metaline Falls, Wash., plant has suspended operations until April 1, 1941. Suspension of operations marks the completion of cement manufacture for the construction of Grand Coulee dam. More than 1,500,000 bbl. was shipped from this plant.

Ask Dredging Permit

DILLMAN INDUSTRIES, Caruthersville, Mo., has requested permission of U. S. Engineers to remove sand and gravel from the Mississippi river, from the lower end of islands 2, 3 and 4 at mile 19, a few miles below Cairo, Ill.

TOUGHNESS OF STEEL ASSURES LONG SCREEN LIFE!



OF COURSE you're interested in longer life where your screening is concerned and that life depends to a great extent on the steel of which the screening is made. That's why the toughness "built" into Roebling's "Abraso" screening is so important to you.

This toughness begins in the small open-hearth furnaces where Roebling makes its own screening steel—so that every lot of steel can be carefully watched and controlled to assure uniformity and a high resistance against wear and vibration.

Then, too, Roebling's time-tested wire drawing methods give an extra measure of the toughness it needs. Finally, a uniform, accurate mesh throughout the finished fabric is assured because the wire is fabricated in Roebling's own mill . . . to Roebling's own exacting standards.

Ask our nearest office to show you how Roebling "Abraso" Wire Screening will help save *you* money . . . as it has for so many leading crushed stone and sand and gravel plants.

JOHN A. ROEBLING'S SONS CO.
TRENTON, N.J.
Branches in Principal Cities

ROEBLING 1841 1941 100TH ANNIVERSARY

ROEBLING ABRASO SCREEN

TRADE JERSEY MARK

It's The Famous Plymouth Transmission . . .
Change speeds quickly, with patented sliding gear action. One reason a Plymouth will do the job faster!
Look at The Massive Frame & Bumper Construction
There's where Plymouth builds extra strength, longer life into a locomotive.

Talk over your Locomotive Problems with PLYMOUTH!

● When the *right* locomotive goes to work on your job, you start saving time, fuel, money. Get a free analysis of your locomotive problem—from Plymouth's industrial locomotive engineers. Write, wire or phone. . . .

PLYMOUTH LOCOMOTIVE WORKS
Division of The Fate-Root-Heath Co., Plymouth, Ohio

GASOLINE • DIESEL • ELECTRIC • BUTANE • PROPANE
Plymouth Industrial Locomotives

UNIVERSALS IN 1941 *for*

Look at this boy work! It's a Type "MR" 42 x 96" Double Deck UNIVERSAL in action!

CLEAN SEPARATIONS *with* LARGEST CAPACITIES *at* LOWEST COST!

The late model UNIVERSALS are really "Hitting the Jack Pot" in screening efficiency and economy.

Be sure to make it UNIVERSALS this year for more profit.

Investigate—A revelation awaits you.

Literature on request.

UNIVERSAL VIBRATING SCREEN CO.
RACINE — WISCONSIN

Gravel to Gold

COOLEY GRAVEL CO., Chillicothe, Mo., has sent a number of key men and officials to Como, Colo., to test a gold placer gravel deposit. The company is now operating a gold placer dredge at Townsend, Mont., in charge of L. M. Cooley, and expects to start operations in Colorado if the property proves out.

Operating Season Extended

MEDUSA PORTLAND CEMENT CO., Bay Bridge, Ohio, plant has operated until the first of the year before the annual shutdown. Ordinarily operations suspend about December 1, but increased demand necessitated the extension.

TVA Phosphate Plant

TVA HAS started construction of a $1,000,000 phosphate plant near Columbia, Tenn., to wash and process phosphate rock and to dry the rock for shipment to Muscle Shoals for further treatment.

Cement Production Continues Up

BUREAU OF MINES reports that the portland cement industry in November, 1940, produced 12,689,000 bbl., shipped 10,329,000 bbl. from the mills, and had in stock at the end of the month 20,369,000 bbl. Production and shipments of portland cement in November, 1940, showed increases, respectively, of 14.8 and 1.8 percent as compared with November, 1939. Portland cement stocks at mills were 2.0 percent lower than a year ago. All plants but two reported for November and estimates were made to cover these.

In the following statement of relation of production to capacity, the total output of finished cement is compared with the estimated capacity of 160 plants at the close of November, 1940, and of 161 plants at the close of November, 1939.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	November 1939	November 1940	Oct. 1940	Sept. 1940	Aug. 1940
The month	52.2	59.9	63.7	61.8	57.8
12 months	46.7	49.9	49.3	48.6	48.0

Concrete Pavement Yardage

AWARDS of concrete pavement for November, 1940, have been announced by the Portland Cement Association as follows:

	Square yards awarded during November	first 11 months
Roads	2,186,597	35,588,605
Streets & Alleys	1,658,005	16,699,896
Airports	1,195,395	5,198,014
Totals	5,049,997	57,486,515

The demands for speed in the nation's defense program make DIXIE NON-CLOG HAMMERMILLS more and more the natural first choice for all kinds of crushing, pulverizing and grinding. They will reduce any material, wet, dry or sticky, to any given size in a single operation with absolute uniformity.

All extra large rock that is not reduced to exactly the proper size at the first stroke rebounds to the hammer points where it is struck again until it has reached the desired size and will pass through the screen bars.

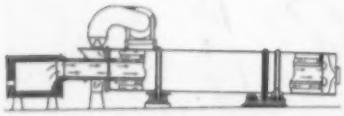
Our complete line of DIXIE STANDARD MOGUL HAMMERMILLS is similar in construction to the NON-CLOG type but are equipped with stationary breaker plates.

40 sizes for any capacity—Primary, Secondary or Fine Reduction.

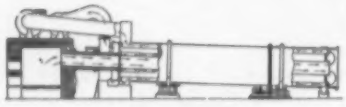
Write for illustrated catalog.

DIXIE MACHINERY MFG. CO.
4100 Goodfellow Ave., St. Louis, Mo.

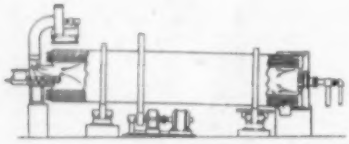
"RUGGLES COLES" DRYERS



XA Dryer
Double shell direct heat

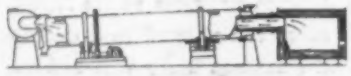


XB Dryer
Double shell indirect heat



C Dryer
Rotary Steam tube Dryer

XF Dryer
Single shell direct heat



XH Dryer
Parallel flow Dryer

XW Dryer
Single shell heater Dryer

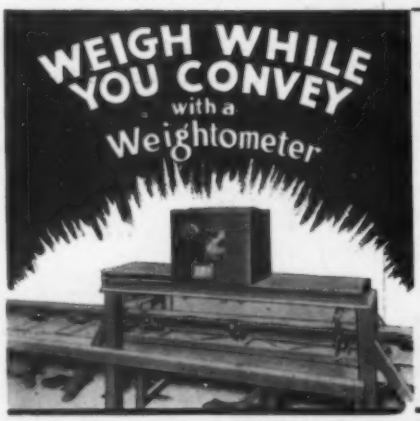
Also three other types to dry special materials. No wonder "Ruggles Coles" engineers are considered "tops" in drying since they have a world of drying experience to back up their recommendations.

HARDINGE
COMPANY, INCORPORATED - YORK, PENNSYLVANIA
NEW YORK, CHICAGO, SAN FRANCISCO, TORONTO

Distribution of Federal Aid Highway Money

FEDERAL WORKS ADMINISTRATOR, John M. Carmody, on December 30, 1940, apportioned $134,062,500 among the 48 States, the District of Columbia, Hawaii and Puerto Rico, as federal aid for highway improvement and the elimination of hazards at railroad crossings. These funds are from appropriations authorized for the fiscal year beginning July 1, 1941.

State	Regular Federal Aid	Secondary or Feeder Roads	Grade Crossings	Total
Alabama	$2,080,245	$364,043	$406,480	$2,850,768
Arizona	1,435,382	251,192	129,679	1,816,253
Arkansas	1,707,928	298,687	336,619	2,343,434
California	3,982,125	696,872	799,099	5,478,096
Colorado	1,798,524	314,742	252,705	2,365,971
Connecticut	620,997	108,674	164,330	894,001
Delaware	487,500	85,313	97,500	670,313
Florida	1,425,748	249,505	299,547	1,974,801
Georgia	2,519,366	440,689	488,535	3,448,790
Idaho	1,235,985	216,297	167,025	1,619,307
Illinois	3,954,419	692,023	1,011,900	5,658,342
Indiana	2,415,900	422,782	501,817	3,340,499
Iowa	2,505,523	438,467	538,808	3,482,798
Kansas	2,539,360	444,388	487,825	3,471,573
Kentucky	1,840,894	322,156	357,973	2,521,023
Louisiana	1,467,186	256,758	318,101	2,042,047
Maine	866,500	151,637	133,657	1,151,794
Maryland	833,715	145,900	204,759	1,184,374
Massachusetts	1,311,369	229,489	387,602	1,928,460
Michigan	3,028,316	529,955	651,077	4,209,348
Minnesota	2,709,402	474,145	525,569	3,709,116
Mississippi	1,773,232	310,316	314,017	2,397,565
Missouri	2,967,206	519,261	580,174	4,066,641
Montana	2,018,907	353,309	262,484	2,634,700
Nebraska	1,991,356	348,487	335,670	2,675,513
Nevada	1,274,718	223,076	97,500	1,595,294
New Hampshire	487,500	85,313	97,500	670,313
New Jersey	1,274,429	223,025	376,651	1,874,105
New Mexico	1,620,981	283,672	170,673	2,075,326
New York	4,824,597	844,304	1,330,049	6,998,950
North Carolina	2,378,838	416,297	515,538	3,310,673
North Dakota	1,504,377	263,266	300,388	2,068,031
Ohio	3,526,158	617,079	818,286	4,961,533
Oklahoma	2,271,217	397,463	439,081	3,107,761
Oregon	1,647,906	288,383	228,715	2,165,004
Pennsylvania	4,095,568	716,724	1,091,120	5,903,412
Rhode Island	487,500	85,313	97,500	670,313
South Carolina	1,341,640	234,787	297,944	1,874,371
South Dakota	1,583,613	277,132	260,078	2,120,823
Tennessee	2,114,507	370,039	381,156	2,865,702
Texas	6,294,440	1,101,527	1,096,857	8,492,824
Utah	1,123,714	196,650	129,466	1,449,830
Vermont	$487,500	$85,313	$97,500	$670,313
Virginia	1,844,069	322,712	375,157	2,541,938
Washington	1,580,939	276,664	304,376	2,161,979
West Virginia	1,095,332	191,683	264,524	1,551,539
Wisconsin	2,406,404	421,121	484,129	3,311,654
Wyoming	1,246,363	218,112	131,610	1,596,075
Hawaii	487,500	85,313	97,500	670,313
Dist. of Col.	487,500	85,313	97,500	670,313
Puerto Rico	495,603	86,731	166,250	748,584
TOTAL	$97,500,000	$17,062,500	$19,500,000	$134,062,500



For over 30 years the Cement and Allied Industries have used Merrick equipment for weighing, feeding and proportioning. Many original installations are still in daily service. Successful operators continue to specify Merrick equipment, time-tried and proved and built for today's needs.

Send for Bulletin No. 375.

MERRICK SCALE MFG. CO.
188 AUTUMN ST. PASSAIC, N. J.

MAXIMUM HAULING . . .

At A Minimum Cost!

At the quarry, where smooth, quick power is a vital factor; the Lima Shay Geared Locomotive is an important production unit. Lima Shays are designed to haul maximum payloads over the toughest grades quickly and economically.

The design of the Shay, with all parts readily accessible, facilitates the job of lubrication, adjustment, or repairs. Investigate the full possibilities of Lima power in your quarry.

LIMA LOCOMOTIVE WORKS, Incorporated
LIMA, OHIO
Sales Office: 60 E. 42nd St., New York, N. Y.

Specify TISCO

AGAIN FOR 1941
FOR ALL WEARING PARTS

The advent of 1941 marks the 199th year of our service to American industry. TISCO is the original American made manganese steel. The ability of manganese steel to withstand the shock, abrasion, wear and tear of high speed production has made low cost operation possible in quarries, mines, and mills. Good machines are equipped with it. Insist on it.

TW

WEARING PARTS FOR
Jaw, Gyratory & Roll Crushers
Hammer Mills & Pulverizers
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Pumps
Dredges, etc
Manganese Nickel Steel Welding Products
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See us at the —
National Sand & Gravel Association Convention
National Crushed Stone Association Convention
Cincinnati, Ohio — January 15th to 22nd, 1941

TAYLOR-WHARTON IRON AND STEEL CO.
HIGH BRIDGE, NEW JERSEY
PLANTS AT HIGH BRIDGE, N. J.—EASTON, PA.
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No other screening medium for shaking and vibrating screens offers ALL the advantages of Hendrick Perforated Plate:

—round, square, hexagonal, slotted, "Squaround" and special openings.

—double corrugations; flat or rolled to any diameter.

—availability in a variety of metals, particularly Hendrick High Carbon Heat Treated Steel, treated after perforating.

Send for a copy of latest booklet, "Perforated Plate for Vibrating and Shaking Screens."

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ALL TYPES — ALL SIZES
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When you call on Butler to furnish your plant, you are not merely buying equipment —you are getting the benefit of a vast fund of engineering skill and experience in the layout and design of plants of all kinds. Remember that Butler engineers are *specialists* in plant design, for their energies are not diffused over a large number of unrelated products. Why not let us help you plan your plant? Our service carries no obligation.

150 cu. yd. three compartment bin with auxiliary hopper for bulk cement—Butler-built from charging hopper to discharge chute.

150 cu. yd. four compartment bin with cement elevator and belt conveyor delivering 180 yards of concrete per hour on large housing project.

The Butler Bin Company is equipped to design and build every type of plant—for heavy construction, ready-mixed concrete, screening and crushing, concrete products, road building, and related fields. Investigate our service today.

Butler Bin Company

Waukesha, Wisconsin

Concrete Brick Development

BRIKCRETE ASSOCIATES, INC., Grand Rapids, Mich., has been formed as the result of several years' development to perfect a concrete brick competitive with frame construction. Special machinery has been developed for this process. It is reported that much interest is being shown in the new product and that plants are already being proposed in many parts of the country, in Mexico, Cuba and as far as India. "Brikcrete" comes in a size equal to four standard brick, and was developed particularly for home construction.

Buys Cement Plant

PACIFIC PORTLAND CEMENT CO., San Francisco, Calif., has purchased the Beaver Portland Cement Co. plant at Gold Hill, Ore., and sales office in Portland, Ore. No changes in personnel at the plant are contemplated. W. P. Muirhead, works manager, will continue in that capacity; C. W. Martin is chief engineer; and C. Gilchrist is chief chemist. The plant is wet process, with a 10 ft. x 11 ft. 3 in. by 240 ft. kiln and an annual capacity of 600,000 bbl. of cement.

Installs Block Machinery

CINDER BLOCK CO., Richmond, Va., has installed a Stearns Joltcrete concrete block machine with overhead mixer fed by skip-hoist, and is marketing units made by the machine under the name "Cind - R - Bloc," which is the trade mark of the N.C.C.P.A.

To Make Pottsco Block

CUNARD-LANG CONCRETE CO., Columbus, Ohio, is installing a Besser vibrating concrete block machine. It is also building a 250-ton silo for the storage of Pottsco aggregates to be used in manufacturing lightweight concrete block.

New Vault Plant

LARSON - SMITH CO., Torrington, Conn., has been organized as a partnership by John W. Smith, G. Herbert Larson and John F. Donaldson to manufacture Norwalk concrete vaults. Litchfield county is covered in the franchise.

Ready Mix in Florida

DUNHAM-HILL CONCRETE CO., Orlando, Fla., has been organized by C. A. Dunham and J. B. Hill and is operating a new ready-mixed concrete plant in that city. The batching plant is of modern type and aggregates are received in carload lots, crushed stone from the Florida Crushed Stone Co., Leesburg, and sand from the Acme and the Mill Creek Sand Co. Delivery equipment consists of six Diamond T trucks with Smith Mobile-Mixers.

Concrete Brick in Lieu of Lumber

QUARTZITE STONE CO., Lincoln, Kan., has noted a pickup in its concrete brick business as an indirect result of government building for national defense. Builders, other than those working on defense orders and using lumber heavily, are using brick instead of lumber.

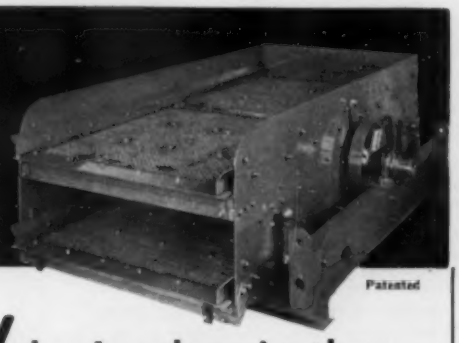
Increase Block Capacity

PEERLESS CEMENT PRODUCTS CO., Charleston, W. Va., has replaced eight block machines with a Besser Vibrapac machine to manufacture cinder concrete units, with an increase of 50 percent in capacity. Elias Fellabaum heads the company.

Gravel Washing Plant

COPPER BASIN PLACER CORP., Prescott, Ariz., has spent $10,000 for a sand and gravel washing plant, and has 1900 acres of gravel land under lease. L. H. Chesebro, Prescott, is to be in charge of operations.

SECO VIBRATING SCREENS



Selected by Leaders in the Industry for Efficiency and Low Cost Per Ton Screening

Month after month the number of successful plant operators who install SECO Screens increases. Their consistent record for increased efficiency, continuous service and lowest maintenance cost is the obvious reason.

SECO SCREENS have a positive, controlled motion—a motion uniform at all speeds, and not affected by condition of feed or load. The patented equalizer assembly, an exclusive SECO feature, links on all four corners, definitely assures a uniform rotation at all points of the vibrating body, and controls this motion regardless of the load imposed at the feed end.

The sharp action of the vibrating body of a SECO screen is not dampened by resilient mountings. To this positive action has now been added a feature, also patented, that is unique in its ability to keep finer meshes from blinding.

For higher efficiency, continuous service at lowest maintenance cost—do as others have done—install a SECO.

WRITE for the fully descriptive catalog.

SCREEN EQUIPMENT CO., INC.
9 Lafayette Avenue BUFFALO, N. Y.

Traffic and Transportation

PROPOSED RATE CHANGES—The following are the latest proposed changes in freight rates up to and including the week of December 14:

Central

64045 (2). **Sand** (except industrial), in open top equipment, C. L. Establish on, from Essex, Ill., to Richmond, Ind., 204c per net ton.

64699. (2)—**Lime** (calcium), carbonate of (recarbonated waste), in packages or in bulk, C. L., min. wt. 50,000 lb. Establish on, from Painesville and Perry, O., to Dunkirk, Ind., 14c.

64711. **Crushed stone**, C. L., when shipped in bulk in open top cars. Establish on, from Greenfield, O., to Harrison, O.-Ind., 116c net ton.

64723 (cancels W. D. A. 64330). **Lime**, common, hydrated, quick or slaked, C. L., in bags, barrels, casks, iron drums, or in bulk. (a) Min. wt. 30,000 lb. (b) Min. wt. 50,000 lb. Establish on, rates as shown below: From Mosher, Mo., to Troy, Ohio: (a) 20c; (b) 16c. From Hannibal, Mo., Marblehead, Ill., and Quincy, Ill., to Troy, Ohio: (a) 20c; (b) 17c.

64769. **Quartzite** (silica rock), crude, broken or crushed (not ground or pulverized) in open-top cars (see Note 3), but in no case less than 80,000 lb. Establish on, from Kent, Va., to Alloy, W. Va., 176c per net ton, via established Routing Guide Routes.

64729. **Mica scrap and mica ore**, waste, crude, min. wt. in straight C. L., 50,000 lb., and in mixed C. L., 60,000 lb. Establish on, rates as shown below:

To Chicago, Ill.: From Quebec, Que., 52c; from St. Raymond, Que., 55c; from St. Romuald, Que., 52c.

To Glens Falls, N. Y.: From Quebec, Que., 27c; from St. Raymond, Que., 30c; from St. Romuald, Que., 27c.

To Rutherford, N. J.: From Quebec, Que., 36c; from St. Raymond, Que., 39c; from St. Romuald, Que., 36c.

Routing—Via routes authorized in C. N. Rys. Routing Guide G. 10, I. C. C. E-395.

64773. **Industrial sand**, per Description (a), (b) and (c), C. L. Establish on, from Copley, O., to Portsmouth, Va. (a) 385c; (b) 424c; (c) 385c net ton.

64776. **Industrial sand**, per usual Description (a), (b) and (c). Establish on, from Copley, O., to Mt. Savage, Md., (a) 231c; (b) 254c; (c) 220c net ton.

64777. **Sand** (except industrial) in open top equipment. Establish on, from Essex, Ill., to Three Rivers, Mich., 149c per net ton via usual available routes. (See Note 6.)

64778. (2)—**Limestone**, agricultural, unburned in bulk in open top cars, C. L. Establish on, from Genoa and Martin, O., to Columbus, O., 121c per net ton.

64813. **Sand** (except industrial), and gravel, in open top cars, C. L. Establish on, from Clyde, W. Va., to Alloy, W. Va., 77c net ton, via N. Y. C. R. R. (W.) direct.

64814. **Limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb. Establish on, from Speed, Ind., to Charlestown, Ind., 83c net ton.

64898. **Stone**, crushed (in bulk) and **crushed stone screenings** (in bulk), in bulk), in open top cars, C. L. Establish on, from Findlay, O., to Stryker, O., 99c per net ton.

64901. **Sand** (except industrial) in closed equipment, C. L. Establish on,

---

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason. No present or prospective movement.

Note 5—Reason: Comparable with rates from other origins in immediate vicinity.

Note 6—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

Note 7—The oil, tar or asphaltum not to exceed 10% of weight of the commodity shipped, the shipper to so certify on shipping order or bill of lading.

HERE'S THE TRUCK MIXER
for Quality Mix

Ransome

Do you know why Ransome Truck Mixers deliver a "Higher Quality" concrete? Write for the complete story or ask any owner.

RANSOME CONCRETE MACHINERY COMPANY
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ALLEN

SAND TANKS

for

EXACTING GRADATION
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SILT REMOVAL
DEWATERING

Accurate classification to produce CONCRETE, MASON and ASPHALT sands to meet the most rigid state and local specifications.

We can determine the proper classifying and settling areas required to give you the maximum quantities of each grade if we know (1) the average screen analysis of your sand, (2) the volume of water accompanying the sand, (3) the products you wish to produce.

More than fifty (50) ALLEN TANKS are recovering fine sand previously lost in the overflow of drags, screws and other types of mechanical classifiers.

ALLEN TANKS are built in large sizes, thus giving ample settling areas to drop out the finest sizes but permitting the overflow of silt.

We Invite Inquiries

ALLEN CONE & MACHINERY CORP.
ENGINEERS
30 Church St. New York City

"WITH Gardner-Denver UM-99 Wagon Drills on the job, our maintenance costs were kept at an absolute minimum"—that's what contractors said about UM-99's on the Mud Mountain Dam Project in Washington.

Drilling for excavation in the spillway, a very hard rock was encountered. Even though drilling was tough, and 16-foot steels were used, the Gardner-Denver UM-99's have given unfailing service since the beginning of operations.

Wherever rough ground necessitates frequent moving for down holes, toe holes, or line drilling, the Gardner-Denver UM-99 gives the same unfailing service at rock bottom maintenance costs.

Investigate the advantages the UM-99 offers for your operations. Write for particulars to Gardner-Denver Company, Quincy, Illinois.

★ ★ ★

The Gardner-Denver WDS Wagon Drill is recommended for drilling deep holes, 12 to 36 or even 40 feet. Perfectly adaptable for quarry work, as quick and easy adjustments make it possible to plumb the mast for absolutely vertical drilling, regardless of surface conditions.

GARDNER-DENVER
SINCE 1859

from Rosy Mound, Mich., to Milwaukee, Wis., 110c per net ton.

65000. **Lime,** common, hydrated, quick or slaked, in bags, barrels, casks, iron drums or in bulk, C. L. Establish on, from Hannibal-Marblehead-Quincy Dist., to Mineral Ridge, O., 24c, min. wt. 30,000 lb. and 19c, min. wt. 50,000 lb., via Wab. Ry., Huntington, C. & E. (Erie Sys.), Marion, O., Erie (W).

65069. **Crushed stone,** C. L. Establish on, from Greenfield, O., to Charleston, W. Va., 138c per net ton.

65070. **Limestone,** ground or pulverized, unburnt, C. L., min. wt. 60,000 lb. Establish on, from Speeds, Ind., to Charlestown, Ind., 72c per net ton.

65072. **Slag,** expanded (construction material aggregate), C. L. Establish on, from Hamilton, O., to Buffalo, N. Y., 255c and Toledo, O., 190c per net ton.

65111. **Fluorspar,** C. L., in packages or in bulk, min. wt. 40,000 lb. Establish on, to Midland, Mich., from Brookport, Golconda, Homberg, Metropolis, Ill., Evansville, Ind., 649c; Cochrane Spur, Eichorn, Rosiclare, Stewart, Ill., Cerculean, Crayne, Crider, Fredonia, Marion, Mexico and Princeton, Ky., 682c per net ton.

65113. **Roofing granules,** min. wt. 80,000 lb. Cancel Item 9985, CFAL Trf. 218-M, publishing rate of 473c per net ton on, from Chicago, Ill., to York, Penn., classn. basis to apply in lieu thereof.

65124. **Sand** (except industrial), in open top equipment, C. L. (see Note 6). Establish on, to Lake Ciecott, Ind., from Black's Siding, Mich, 253c in open and closed cars; from Vassar group, viz.: Juniata, McHale, Wampson and Watrousville, Mich., 237c in open cars and 424c per net ton, in closed cars.

65145. **Limestone,** ground or pulverized, unburnt, C. L., min. wt. 60,000 lb. Establish on, to Grand Rapids, Mich., from Marlo, Mosher, Ste. Genevieve, Mo., 325c; Hannibal, Quincy and Marblehead, Mo., 303c per net ton.

65147. (Cancels W. D. A. 62297) **Lime,** agricultural, C. L. Establish on, from Northwestern Ohio Group 1 pts., viz.: Bettsville, Carey, Genoa, Gibsonburg, Luckey, McVittys, Maple Grove, Marblehead, Martin, Nario and Woodville, O., to Eaton, O., 12c, min. wt. 50,000 lb.; 15c, min. wt. 30,000 lb.

65157. **Agricultural limestone,** unburned (not ground or pulverized) in bulk, in open top cars only, C. L. Establish on, from Nario, O., to Dover, New Philadelphia, Parral and Strasburg, O., 127c per net ton, via usual available routes.

65161. **Slag** (a product of iron or steel furnaces), crushed, in bulk, in open top cars, C. L. Establish on, from Richmond, Ind., to Hamilton, O., 88c per net ton.

64853. **Gypsum rock,** crushed (not ground), or run of mine, C. L. (see Note 3), but not less than 60,000 lb. Establish on, to Kosmosdale, Ky., from Grand Rapids, Mich., Gypsum, Port Clinton, O., 319c; Alabaster and National City, Mich., 374c per net ton.

64872. **Roofing granules,** C. L., min. wt. 60,000 lb. Revision of rates on, from Darlington, Penn. Proposed rates: To North Tonawanda, Niagara Falls, Lockport, N. Y., 262c; Cincinnati, Lockland, O., 305c; Franklin (Warren, Co.), O., 286c; per net ton; Erie, Penn., 219c per net ton.

Trunk

39298. **Rip rap or rubble stone,** C. L. (see Note 3), from Pennington, N. J., to P. R. S. L. stations, Swedesboro, Harrisonville, Woodstown and Wenonah, N. J., $1.43 per net ton in lieu of current 6th class rates.

39333. **Crude feldspar,** in packages or in bulk, C. L., from Egan Estate, Ont., to Genesee Dock, N. Y., 17½c per 100 lb. min. wt. 100,000 lb., and to Rochester, N. Y., 23c per 100 lb., min. wt. 60,000 lb., in lieu of current rate of 32c per 100 lb., min. wt. 60,000 lb. (See Note 5.)

39335. **Limestone,** crushed or broken, ground or pulverized, C. L., min. wt. 60,000 lb. from Pleasantville, N. J., to Port Allegany, Pa., $3.03 per net ton in lieu of current 6th Class rate of 31c per 100 lb. (See Note 5.)

39398. **Feldspar,** C. L., (see Note 1), from Bedford and Brookneal, Va., to Abingdon, Alton, E. St. Louis, Granite City, Macomb, Monmouth, White Hall, Ill., and St Louis, Mo., $6.05 per net ton in lieu of current class rates. (See Note 5).

39402. Ground or pulverized **Limestone,** C. L., min. wt. 60,000 lb., from Oriskany Falls, N. Y. to Ausable Forks, N. Y., $2.26, and to Russia, N. Y., $2.15 per net ton, in lieu of current 6th class rates. (See Note 5.)

39424. **Crude feldspar,** C. L., min. wt. 80,000 lb., to Fonda, N. Y., from Perth, Ont., 20c. and from Bathurst, Glen Tay, Godfrey, Hartington, Ont., and Buckingham, Que., 21c per 100 lb. (See Note 5.)

Illinois

IRC 6535-2. **Sand** (industrial), C. L. (See Note 3), but not less than 40,000 lb., Ottawa and Utica, Ill., to Bethalto, Ill. Present—293c net ton. Proposed—153c net ton.

IRC 6624-6 (CSC 465-P). **Fluxing stone,** containing less than 1 percent of silica, C. L., (see Note 3), but not less than 60,000 lb., from industries on C. & I. W. R. R. at McCook, Ill., to industries on E. J. & E. Ry. at South Chicago, Ill., Buffington and Gary, Ind. Present, 4½c per 100 lb.; proposed, 50c net ton.

IRC 7056-3-A. **Sand,** Browntown, Wis., to St. Louis, Mo., E. St. Louis and Granite

Cash Price $2500

A COMPLETE
TRANSPORT MIXER
WITH TRUCK

Delivered $2500

"The Best Truck Mixer Buy In America"

slightly higher west of the Rockies

prices subject to change without notice

Specifications

Transport Truck Mixer—1½ cu. yd. Rating (Actual N.R.M.C.A. Rating 1.75 cu. yds.) with exclusive features—revolving blade mixing action—open top for fast charging and visible mixing—inexpensive rubber insert mixing blades—dual discharge.

Chevrolet or Ford Chassis, large motor, 2 speed axle, helper springs, 7.50 x 20 front tires, 34 x 7 ten ply dual rear tires.

State Sales and Special Taxes Extra

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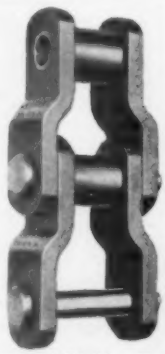
CONCRETE TRANSPORT MIXER CO., INC.
630 Rosedale Ave., St. Louis, Mo.

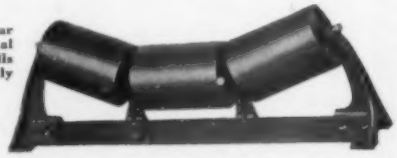
CHAINS—TRANSMISSION MACHINERY—MATERIAL HANDLING EQUIPMENT

A chain for every elevating and conveying service and for drives; belt idlers for light, intermittent and heavy duty service; buckets and bucket elevators; spiral flights and troughs, steel boots; car pullers; pillow blocks; couplings; clutches; take-ups; pulleys; shafting; gears . . . you can get them all from Jeffrey where quality really proves a real economy. Carried in stock for prompt shipment.

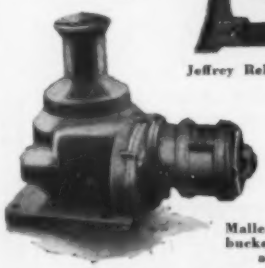


Jeffrey steel thimble roller drive chain

Below — all-purpose car puller with large vertical capstan. Two sizes. Pulls in any direction. Fully enclosed.



Jeffrey Reliance 3-roll belt idler. Also self-aligning idlers.



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The Jeffrey Manufacturing Company
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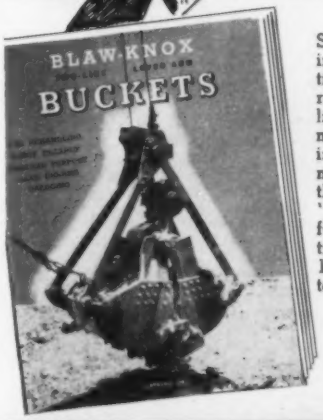
BUCKETS have
SEALED
BALL BEARING
SHEAVES



Sealed ball bearing sheaves in the lever arm reduce lost time and expense of bearing replacement, increase cable life and reduce friction, materially improving operating efficiency. This, and many other better features, that make BLAW-KNOX the "wise" buy in buckets are fully explained and illustrated in NEW CATALOG 1757. Send for your copy today.

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of Blaw-Knox Company
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BLAW-KNOX
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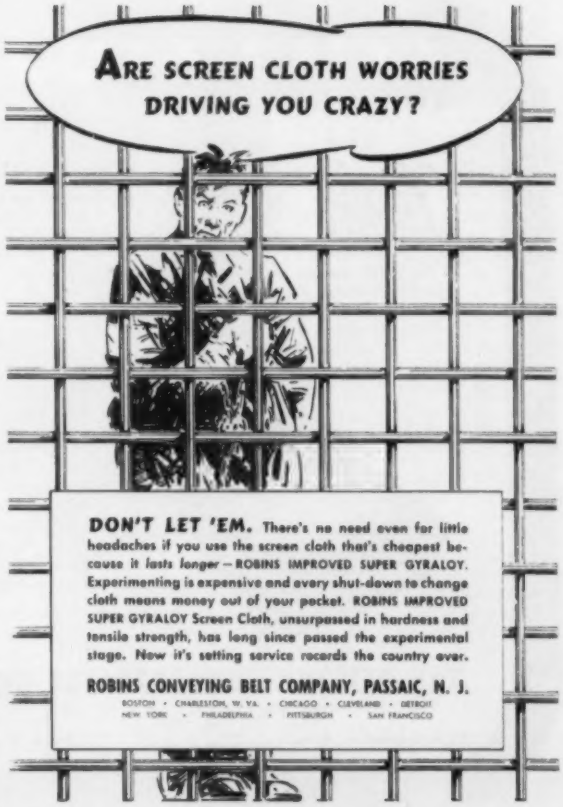
BLAW-KNOX DIRT AND BATCHERS · ROAD FORMS · STREET FORMS · CONCRETE SPREADERS · TAMPING ROLLERS · VIBRATORS
CONCRETE BUCKETS · CLAMSHELL BUCKETS · TRUCK MIXERS · STRIPING MACHINES · TURNTABLES · ROAD FINISHERS · STEEL FORMS

ARE SCREEN CLOTH WORRIES DRIVING YOU CRAZY?



DON'T LET 'EM. There's no need even for little headaches if you use the screen cloth that's cheapest because it *lasts longer* — ROBINS IMPROVED SUPER GYRALOY. Experimenting is expensive and every shut-down to change cloth means money out of your pocket. ROBINS IMPROVED SUPER GYRALOY Screen Cloth, unsurpassed in hardness and tensile strength, has long since passed the experimental stage. Now it's setting service records the country over.

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(Pronounced COLE'-MON-OY)

CLINKER PLOWS, FOR EXAMPLE

A clinker plow, operating in a Bradley Mill, was hard-faced with one pound of COLMONOY Sweat-on Paste. A careful check was made after 1900 hours of operation, showing that this application outwore 10 pounds of ordinary hard-facing materials and a single application outwore four applications of the other materials. This should be worth your serious consideration.

WRITE FOR CATALOG
Full information on the various grades of COLMONOY that meet every hard-surfacing requirement.

WALL-COLMONOY CORP.
Sixth Floor, Buhl Bldg., Detroit, Mich.
558 W. 54th St. NEW YORK
2054 W. Harrison St. CHICAGO
208 Midco Building TULSA
3155 Seneca St. BUFFALO
123 W. Philadelphia St. WHITTIER, CALIF.

COLMONOY
Hard Surfacing Alloys and Overlay Metals

UNIFORM SEPARATION for LIME AND CEMENT

GAYCO Air Separators will make it easier to maintain a pre-determined circulating load and step up your mill capacities and efficiency. All fines are removed as they are made, thereby preventing the cushioning effect of the fine material. Coarse particles are rejected by a new type adjustable centrifugal sizing fan — an exclusive GAYCO feature.

With a GAYCO you get all these advantages:

99% through 325 mesh
25 to 30% greater recovery of fines
Range 60 to 400 mesh
Greater capacity
Cleaner tailings
Uniform products
Not affected by variation of speed or rate of feed

Write for complete details.

UNIVERSAL ROAD MACHINERY CO.
RUBERT M. GAY - DIVISION
117 LIBERTY STREET NEW YORK CITY, U. S. A.

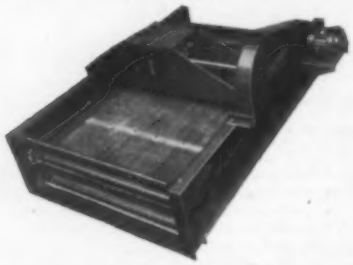
1941 CAN BE YOUR BEST YEAR

with

Leahy HEAVY DUTY

NO-BLIND VIBRATING SCREEN WITH *TRI-VIBE* *for Fine Mesh Screening*

TRI-VIBE is an exclusive engineering feature which gives triple-powered vibration to the free swinging screen jacket and distributes the differential vibrating action to all areas of the screen cloth. Screening action is as effective at the edges as at the center of the screen. This is why the LEAHY Vibrating Screens operate in the 90% efficiency range, with 97% efficiency not uncommon. Requires only ½ h. p. due to perfectly balanced, friction-free mechanism. Yearly maintenance expense for continuous operation averages less than 1% of the original investment.



Write for Bulletin No. 14-H.

THE DEISTER CONCENTRATOR COMPANY

The Original Deister Co., Est. 1906

915 Glasgow Ave. Fort Wayne, Ind.

THE ROSS FEEDER

Completely controls the flow of any size material from Storage Bins, Hoppers or Open-Dump Chutes to Crushers, Conveyors, Screens, etc.

High in efficiency. Low in maintenance and power consumption.

Furnished in sizes to suit your operation. Send full particulars for recommendation.

ROSS SCREEN & FEEDER CO.

19 Rector Street NEW YORK, U. S. A.

2 Victoria Street LONDON, S. W. 1, ENGLAND

MANGANESE STEEL CASTINGS

for CRUSHERS PULVERIZERS ROLLS SCREENS

for SHOVELS DREDGES CRANES CONVEYORS

The Frog, Switch & Mfg. Co.

Established 1881 CARLISLE, PA.

City, Ill. Present, a, 278c; b, 253c; c, 253c. Proposed, a, 254c; b, 231c; c, 220c. Description: (a) Sand in all kinds of equipment. (b) Sand, naturally bonded moulding, in all kinds of equipment—sand (except naturally bonded moulding; ground or pulverized sand) in closed equipment. (c) Sand (except naturally bonded moulding; ground or pulverized sand) in open top equipment.

IRC 6637-1. **Crushed stone,** C. L. (See Note 3), from Lehigh, Ill., to Symerton and Manhattan, Ill. Present—Class. Proposed—97c net ton.

IRC 9012-A. **Sand** (except industrial) and **gravel,** C. L. (See Note 3), but not less than 40,000 lb., from Gravel Pit (Rock Island County), Ill., to destinations in I. R. C. territory within approximately 100 mile radius. Present—Combination. Proposed—10c per net ton over present Rock Island, Ill., rates.

IRC 9016-3. **Lime rock, limestone** or **chatts,** broken crushed or ground, from Mosher and Ste. Genevieve, Mo., to Chicago, Decatur, Springfield, Ill., Milwaukee, Wis., etc., "A" refers to present; "B" to proposed rates): To representative, Milwaukee, Wis., A 325c, B 248c; Decatur, Ill., A 153c, B 160c; Springfield, Ill., A 176c, B 154c.

IRC 9214. **Sand,** sand pit strippings, C. L. (See Note 2), but not less than 40,000 lb., from Ottawa, Oregon, Wedron, Sheridan, Utica and Millington, Ill., to Bunker Hill, Ill. Present—195c net ton. Proposed—153c net ton.

Southwestern

22165. Establish specific commodity rate of 227c per ton of 2000 lb. on **sand** (except asbestos sand and except silica sand in box cars) C. L., from Camden, Tenn., to Pine Bluff, Ark.

22549. **Limestone,** ground and pulverized, C. L., min. wt. at per Item 60, S. W. L. Tariff 162, from Mosher and Ste. Genevieve, Mo., to Memphis, Tenn., $1.60 and to Natchez, Miss., $2.38 per ton of 2,000 lb.; from Limedale Spur, Ark., to Memphis, Tenn., $1.30 and to Natchez, Miss., $1.90 per ton of 2,000 lb.

22742. **Silica or tripoli,** Hot Springs, Ark., Racine, Mo., Rogers, Ark., and Seneca, Mo., to Relee, Va. Establish rate of 39c per 100 lb. on silica or tripoli, crushed, ground or pulverized, straight or mixed C. L., min. wt. 80,000 lb.

22778. **Gypsum, dead-burned,** unground. Establish rates of 700c per ton of 2,000 lb. on C. L. (see Note 2), but not less than 85,000 lb. from Southard, Okla., to Easton, Penn.

22833. **Lime** (calcium). Establish the rates of 24c per 100 lb., min. wt. 30,000 lb., and 19c per 100 lb., min. wt. 50,000 lb., on lime (calcium) viz.; common lime, hydrated, quick or slaked, C. L., from Neosho, Pierce City, Sequiota and Springfield, Mo., to Hobart, McCool, Crocker and Porter, Ind.

Texas-Louisiana

5412. **Phosphate rock.** Establish a proportional rate of 6c per ground or pulverized, acidulated (acid phosphate), min. wt. 80,000 lb. from Tyler to Pittsburg, applicable only when the outbound bill of rating is endorsed showing inbound movement via St. L. S. W. of T. on crude phosphate rock equal to 62½ per cent of the outbound weight.

New England

52673 (I-R). **Lime,** common, hydrated, quick or slaked, min. wts. 30,000 and 50,000 lb., from New Haven, Conn., to Chicago, Ill. Present—45 (6th class, min. 30,000 lb., as per Agent Doe's I. C. C. 362); proposed—30,000 lb.—704c and 50,000 lb.—561c per ton of 2000 lb. Reason: Same basis as now in effect from other New England points.

TIPS - - - -

That Save You Money

SAVE WITH ORO RENEWABLE TIP HAMMERS

ORO **Renewable Tip Hammers reduce replacement costs and increase operating efficiency by maintaining sharper corners and keeping hammers more nearly their original weight and length.**

Write for Prices

KENSINGTON STEEL CO.
505 KENSINGTON AVE., Chicago, Ill.

WESTERN MFG.
ELECTRIC STEEL FOUNDRY
PORTLAND, ORE.

CUTS COSTS!

Ohio gravel firm separates sand from gravel right at diggings with a

LINK-BELT VIBRATING SCREEN

• The Massillon Washed Gravel Co., Navarre, Ohio, has found how to cut costs with a Link-Belt vibrating screen. By setting up a plant right at the diggings with a vibrating screen for separating the sand from the gravel, they have reduced the cost of transporting to the main plant —a mile away—where the gravel is graded. For two years this Link-Belt Screen has been giving great service. Operating 12 hours a day, it handles 100 tons of sand and gravel every hour with practically no maintenance expense. If you have a screening problem—write for complete information on Link-Belt vibrating screens. Ask for Book RP-1792.

LINK-BELT COMPANY
Philadelphia, Chicago, Indianapolis, Atlanta, Dallas, San Francisco, Toronto. Offices and warehouses located in principal cities. 1271

LINK-BELT *Vibrating* **SCREENS**

YOU TOO CAN MAKE MONEY WITH COAST METALS

MORE EFFICIENCY DURING OPERATION

- Coated with COAST METAL No. 112 the forged steel roll above (fig. 2) wore more evenly than uncoated cast roll (fig. 1), hence greater grinding efficiency during the life of the roll.
- LONGER LIFE. 2400 hours of severe service in a cement plant is the record of the forged steel roll (fig. 2) above, when coated with COAST METAL 112.
- THEN RECOAT INSTEAD OF REPLACE. The worn forged steel roll only needs easily applied COAST METAL resurfacing to be ready again for its difficult task. The cast steel roll must be replaced with a new one.
- WRITE ABOUT YOUR PROBLEMS TODAY. The above rolls illustrate only one of the many uses for COAST METALS today—in your plant there are probably many others where COAST METALS will make money for you.

COAST METALS Inc.
CANTON, OHIO

Tons *for pennies . . .*

With a SAUERMAN Power Drag Scraper you can actually move tons for pennies! You can dig from pit, pond or bank—or handle materials to and from storage piles with surprising economy, with safety and convenience, and with less maintenance trouble and labor cost than any other method.

Write today for the complete SAUERMAN Catalog which describes both the Power Drag Scraper and Cableway Excavator and explains the low cost simplicity of this flexible and dependable equipment. There's a SAUERMAN Machine to meet your requirements—at an installation expense that starts and ends as an excellent investment.

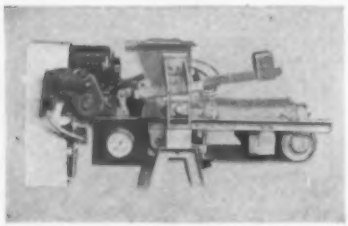
SAUERMAN BROS., INC.
430 S. Clinton St. Chicago, Ill.

for . . .
SAND
GRAVEL
STONE
COAL
ORE

Write for Catalog

A NEW
WEIGHT
RECORDING
FEEDER

Reads direct in tons, pounds, kgms. Also indicates rate fed at any time. Accurate—simple.



HARDINGE
COMPANY, INCORPORATED • YORK, PENNSYLVANIA
NEW YORK, CHICAGO, SAN FRANCISCO, TORONTO

OBITUARIES

WILLIAM F. STOLZENBACH, president of the National Mortar and Supply Co., Pittsburgh, Penn., died December 12. For many years he also was a member of the Board of Directors of the National Lime Association — a representative of district 5-A.

•

GEORGE PEARSON RHODES, president of the Castalia Portland Cement Co., Pittsburgh, Penn., died December 12 at the age of 69. In 1923 he and his brother James D. Rhodes sold their interest in the National Car Wheel Co., which they had founded, and George Rhodes became president of the Castalia company. In the early twenties he also became president of the Colonial Steel Co., and upon its merger with the Vanadium-Alloys Steel Co., he became a director in that concern. He was also a director of a number of other concerns.

•

CONRAD G. BESCH, retired vice-president of the Missouri Portland Cement Co., St. Louis, Mo., died November 20. He was 73 years of age. He was one of the organizers of the Missouri company in 1990, a few years later was named treasurer and became a vice-president in 1920. He organized the Standard Building Materials Co. and also held directorships in the Associated Industries of Missouri and the Tower Grove Bank.

•

T. I. WESTON, president and treasurer of The Weston & Brooker Co., Columbia, S. Car., died November 22. Mr. Weston was president of the National Crushed Stone Association during 1938 and 1939. With his Southern drawl and gentle, serene disposition, he was well-liked by all who knew him. He was one of the staunchest supporters of the crushed stone association.

T. I. Weston

•

FRANK ANDREW LENT, publisher of *Stone* magazine since 1907, died December 21 at the age of 69.

•

C. E. SMITH, works manager of the National Cement Co., Montreal, Canada, died recently at the age of 56.

•

FRED R. DAVIS, a founder of the Audit Bureau of Circulations and advertising space buyer for the General Electric Co. for 35 years, died December 26 at the age of 64. He served as a director of the Audit Bureau of Circulations from the date of its founding in 1914 until his death and since 1927 had also been first vice-president.

More Cement Storage

VOLUNTEER PORTLAND CEMENT CO., Knoxville, Tenn., has built new storage silos for 65,000 bbl. of cement, which is an increase of 70 percent in storage capacity. This plant is supplying about half the cement for construction of Cherokee dam.

New Crushing Plant

FORD SILICA SAND CO., Jacksonville, Ala., has installed a $35,000 crushing plant for the manufacture of ganister grits and concrete grits.

WINTERTIME?
No trouble starting this screen!

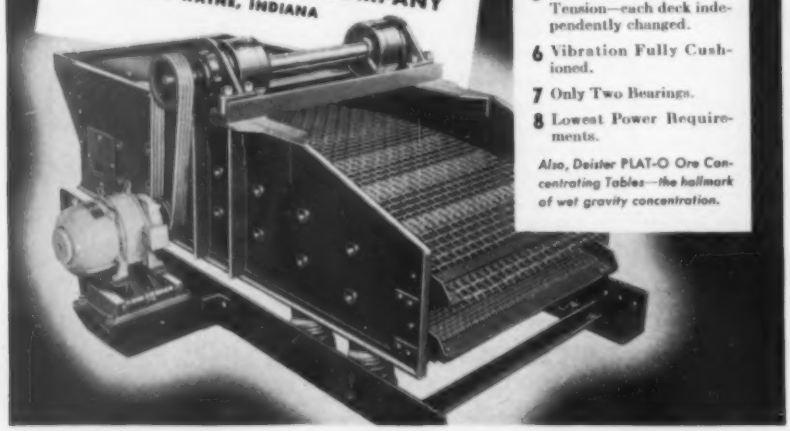
• You don't need a blow-torch to loosen up this screen in cold weather—for *oil, not grease,* lubricates the bearings. Only a half pint of SAE 20 is used in each of the two oversized bearings. Write for new Bulletin, No. 27.

DEISTER MACHINE COMPANY
FORT WAYNE, INDIANA

Demand these 8 Features:

1 Opposed Elliptical Throw—Low Headroom—Accurate Grading—High Capacity.
2 Selective Throw.
3 Powerful Positive High Speed.
4 Oil—Not Grease.
5 Automatic Screen Cloth Tension—each deck independently changed.
6 Vibration Fully Cushioned.
7 Only Two Bearings.
8 Lowest Power Requirements.

Also, Deister PLAT-O Ore Concentrating Tables—the hallmark of wet gravity concentration.



PERFORATED METAL
SAND AND GRAVEL SCREENS

Manufactured exactly to your specifications

Any size or style screen, in thickness of steel wanted with any size perforation desired.

We can promptly duplicate your present screens at lowest prices

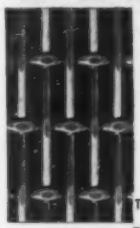
CHICAGO PERFORATING CO.
2437 West 24th Place
CHICAGO, ILLINOIS
Canal 1459

RYERSON CERTIFIED STEELS

LARGE STOCKS... IMMEDIATE SHIPMENT

Principal products include—Alloy Steels, Tool Steels, Stainless Steel, Hot Rolled Bars, Hoops and Bands, Beams and Heavy Structurals, Channels, Angles, Tees and Zees, Plates, Sheets, Cold Finished Shafting and Screw Stock, Strip Steel, Flat Wire, Boiler Tubes, Mechanical Tubing, Rivets, Bolts, etc. Write for Stock List. Joseph T. Ryerson & Son, Inc. Plants at Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

TYLER ELECTRIC AND CIRCLE-THROW MECHANICALLY VIBRATED **SCREENS**



SCREENS UP TO 10" STONE!

THE TY-ROCK SCREEN

TYLER WIRE CLOTH IN ALL MESHES AND METALS

HIGH CAPACITY SCREEN FOR ROCK AND ORE

The **W.S.TYLER** *Company*

3613 Superior Ave. • Cleveland, O. • U. S. A.

HAYWARD BUCKETS

USE RIGHT BUCKET FOR THE JOB

Hayward makes all four—clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.

THE HAYWARD COMPANY
202-204 Fulton Street
New York, N. Y.

WHEN YOU NEED
TRACTION
YOU NEED
THORNTON

THORNTON Four-Rear-Wheel DRIVE
THORNTON Automatic-Locking DIFFERENTIAL

Write for valuable information

THORNTON TANDEM COMPANY
6701-8779 Grinnell Avenue, Detroit, Michigan

WILFLEY
centrifugal SAND PUMPS

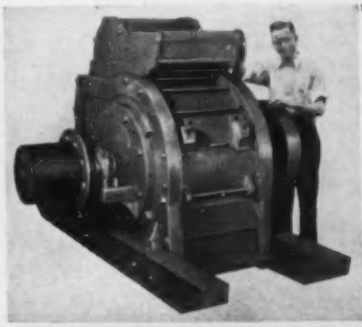
for Slurries, Sand Tailings, Slimes, Acid Sludges

Save Pumping Costs

Continuous operation without attention for long periods. Stuffing box, stuffing, gland water ALL eliminated. Close clearances maintained by easy slippage seal adjustment. Heavy pumping parts of material best suited for YOUR particular problem. Complete engineering service. Prompt shipment of parts. The most efficient and economical pump you can buy. *Write for Complete Catalog*

A. R. WILFLEY & SONS, Inc., Denver, Colo., U. S. A.
NEW YORK OFFICE: 1775 BROADWAY

SUPER-LOY
WOVEN WIRE SCREENS
LUDLOW-SAYLOR
WIRE CO. ST. LOUIS



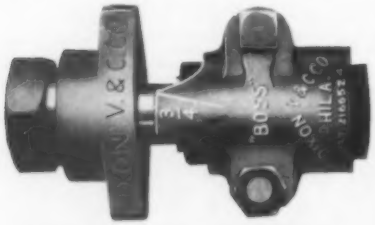
W-I-D-E
Crushing Range of DAY Swing Hammer Pulverizers

...makes one machine serve the purpose of two or more other types of crushers. The toughest crushing jobs are "All in a DAY'S work."

Write for Bulletin.

Brooks EQUIPMENT & MFG. CO
KNOXVILLE, TENNESSEE

Built to Perform With *Cost-Cutting Efficiency* . . . on Every Drilling Job!



"GJ-BOSS"

GROUND JOINT

AIR HAMMER COUPLING

The strongest and most efficient of all air hammer couplings, providing complete freedom from leaks, blow-offs and service delays due to washer replacements. Copper insert in spud fits rounded head of steel stem, forming soft-to-hard metal seal that *will no leak*, regardless of wear or the presence of sand, grit and other abrasive particles. Application of sturdy malleable iron "BOSS" Clamp insures powerful anchorage of entire coupling to hose—proof against vibration and sudden pressure surges. Cadmium plated—rustproof. Compact Type, Style XLB-61, ½" and ¾". Heavy Type, Style XHB-72 ¾" and 1".

"BOSS"

WASHER TYPE

AIR HAMMER COUPLING

Except for ground joint construction, this is exactly the same as the "GJ-BOSS" coupling described above. Instead of being rounded, head of stem is flat flange to seal tightly against the washer. Like the "GJ-BOSS", all parts are steel or malleable iron, cadmium plated to prevent rust and corrosion. Strong "BOSS" Clamp furnished on all sizes. Compact Type, Style WLB-21, ½" and ¾". Heavy Type, Style WHB-32, ¾" and 1".

Carried in Stock by Leading Rubber Manufacturers and Jobbers.

DIXON

VALVE & COUPLING CO.

Main Office & Factory: Philadelphia, Pa.

Branches: Chicago • Birmingham • Los Angeles • Houston

New Incorporations

Rockland Sand & Gravel Corp., New York, N. Y., has been granted a charter at 200 shares no par value. Incorporator is Etelson & Fassberg, 20 N. Main St., Spring Valley, N. Y.

Williams and Phillips, Inc., Ellettsville, Ind., has been granted a charter to manufacture crushed stone, agricultural lime dust and by-products. Capital is 300 shares no par value and incorporators are Paul Phillips, Stanley E. Williams and Claude Williams.

Oro Grande Lime & Stone Corp., Los Angeles, Calif., has been incorporated by P. C. Thompson, R. B. Murphey and Walter E. Bennett. It is capitalized at $50,000.

Coughlin Sand & Gravel Co., Inc., Ellenville, N. Y., has been granted a charter. It is capitalized at $20,000 and incorporated by Vernon J. Kelder, Ellenville, N. Y.

Cortland Stone Corp., Peekskill, N. Y., has been incorporated with a capital of $10,000. Isadore Vogel, 1037 Main St., Peekskill, N. Y., is incorporator.

H. & B. Rock Co., Contra Costa, Calif., has been incorporated by H. G. Hutchinson, M. D. Hutchinson and Forrest C. Brown with a capital of $1500.

Consumers Lime Co., Gold Bar, Wash., has been incorporated with a capital of $100,000. Incorporators are Ivan Merrick, O. W. Gifford and Ivan Merrick, Jr.

San Pierre Cement Products Co., Inc., 111 Green St., San Pierre, Ind., has been incorporated. Capitalization is 100 shares of $100 par value, and incorporators are Al Schrader, Alma K. Pearson and Tom Daly.

Silica Sand Co., Inc., Detroit, Mich., has been incorporated with a capital of $200,000 by Robert E. Bratton, Donald F. Pascoe and Leroy M. Hull.

Neville Brothers Quarry, Glasgow, Ky., has been incorporated by Earl and Cleo Neville at $60,000 capital.

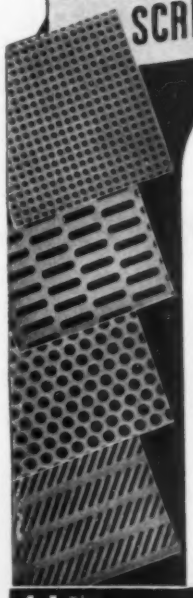
Contractor Materials, Inc., R.R. No. 2, Fort Wayne, Ind., has been incorporated to operate a stone quarry and engage in paving and construction work. Capital is 1500 shares, $10 par value and incorporators are Walter J. Fishering, James R. Fleming and Roland H. Rogers.

Mil. Limestone Products Co., Franklin, Wis., has been incorporated with a capital of 400 shares at $50 each. James A. Buckley, Ann Rasmussen and Edwin S. Cox of Racine are incorporators.

Shell-Stone Lime Co., Ainslie, Ga., has petitioned for a charter with a capital stock of 100 shares at $100 each. The petition was made by E. B. Weatherly, J. H. Milward and Frank A. Dennis, and the postoffice address of the company is to be Cochran, Ga.

Patriotic button created by J. O. Lashar, advertising director of American Chain & Cable Co., Inc., New York City. Mr. Lashar is donating all royalties from the sale of this button to the American Red Cross

PERFORATED *Metal* SCREENS



Any SIZE
Any SHAPE
Any METAL
Any PERFORATION

•

You can safely specify H & K screens and be assured of maximum screening results. Quality both in material and workmanship is always a first consideration.

Write for prices.

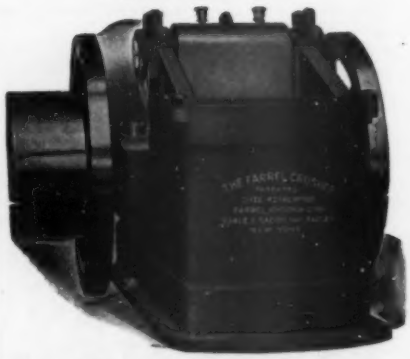
The Harrington & King PERFORATING CO.

5650 Fillmore St., Chicago—114 Liberty St., N. Y.

FARREL BACON CRUSHERS

Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants.

Engineering Service



EARLE C. BACON, Inc.

17 John St., New York, N. Y.

FELLOW CITIZENS!

There are two ways of achieving POTENCY in our NATIONAL ECONOMY, essential to meet the INTERNATIONAL CRISIS, which threatens our mode of life and our most cherished institutions.

One is Coöperation and the other is Coercion. Those who have made the International Crisis are using Coercion. In this country we propose to use Coöperation.

There's a vast difference between the meaning of these two words—just as there is a vast difference between our political inheritance and theirs.

That's why *voluntary* associations have always played a large part in our history. They are essential to maintenance of our liberties because they are natural vehicles of coöperative expression and action.

Fellow citizens who make your livelihood in these industries! It is your duty and it will prove your pleasure and profit to attend the 1941 conventions of your industry.

Silver Anniversary Convention of the **National Sand & Gravel Association**

held in conjunction with Eleventh Annual Convention of

National Ready Mixed Concrete Association

Netherland Plaza Hotel, Cincinnati, Ohio

JANUARY 15, 16, 17, 1941

Twenty-fourth Annual Convention of **National Crushed Stone Association**

Netherland Plaza Hotel, Cincinnati, Ohio

JANUARY 20, 21, 22, 1941

Thirty-Eighth Annual Convention of **American Road Builders Association**

Pennsylvania Hotel, New York City, N. Y.

JANUARY 27, 28, 29, 30, 31, 1941

Classified Advertisements

1941 STARTING OUR 24th YEAR!

Made Possible by Your Confidence

TODAY—better organized and more prepared to serve you with—

A FEW SELECTED ITEMS

1—Bucyrus Erie 44-B Diesel driven 2 yd. SHOVEL.
1—Bucyrus 50-B 1¾ yd. Steam SHOVEL, at Tuscaloosa, Ala.
1—20 ton Link-Belt LOCOMOTIVE CRANE, 8 wheel, Standard gauge, double drum; 50' boom, cast steel side frames on trucks, Mass. boiler.
1—30" Allis-Chalmers Superior McCully GYRATORY CRUSHER.
4—GYRATORY FINISHING CRUSHERS; No. 410-TZ, 4' Traylor, Kennedy No. 25 and No. 49, Telsmith No. 2-F and Telsmith 2' Gyrasphere.
1—5'x10' Allis-Chalmers 2-deck VIBRATING SCREEN; also 3—4'x8' Stephens-Adamson, two double deck and one triple deck.
4—700 CFM Worthington type V-6 AIR COMPRESSORS, 100 lb., each Twin unit with 200 H.P. 3/60/440 volt motor, direct connected.
2—4 and 5-roll Raymond Low Side PULVERIZERS; also No. 0000, No. 00, No. 1 and No. 3, beater type.
1—8'x30" Hardinge Conical BALL MILL, iron lined, with 175 H.P. 3/60/440 volt slip ring motor, chain drive.
1—8'x125' Reeves Bros. ROTARY KILN.

FOR IMMEDIATE SHIPMENT—LOW PRICES

Equipment Remaining at the Castalia Portland Cement Plant in Castalia, Ohio — 60 miles from Cleveland

2—5'x10' Bonnot BALL MILLS, steel lining, with motors. Center and peripheral discharge.
3—ROTARY KILNS—6'x125', 6x120', 6x60'.
3—DIRECT HEAT ROTARY DRYERS—4'6 x 50' double shell, 4x60' and 6x60'.
2—5'x22' Bonnot TUBE MILLS, silex, with motors.
2—5'x27. TUBE MILLS, silex, with motors.
3—18 ton STEAM LOCOMOTIVES, Vulcan and Porter, 36" gauge.
1600 Horsepower in ELECTRIC MOTORS, all 3/60/440 volts. Included are 150 H.P. and 200 H.P. slip ring motors, 585 RPM.

1. **Large and Wide Selection of Machinery at our Newark Shops and at the many plants we liquidate.**
2. **Experienced Staff.**
3. **8 acre Warehouse and Shops at Newark, N. J.**
4. **Substantial Savings—always.**

We are also able to offer other sizes of Jaw, Gyratory and Roll Crushers; Gyratory Finishing Crushers; Shovels, Cranes and Draglines; Locomotives; Vibrating Screens; Elevators; Conveyors; Pulverizers; Ball, Tube and Rod Mills; Filters; Air Classifiers; Dorr Classifiers; Air Compressors, etc.

CONSOLIDATED PRODUCTS CO., INC.

15-16-17 Park Row — New York, N. Y.

Our Shops at Newark, N. J., cover eight acres.

LOCOMOTIVES SHOVELS — CRANES

Attractive Prices

1—80 Ton American 0-6-0 Switcher.
1—75 Ton Baldwin 0-6-0 Switcher.
2—40 Ton American Saddle Tanks.
1—38 Ton Vulcan Saddle Tank.
1—38 Ton Porter Saddle Tank.
2—25 Ton Plymouth—Gasoline. Standard Gauge—Rebuilt

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1—52-B Bucyrus Dragline 70 ft. Boom, Atlas Imperial Diesel Engine.
1—25 Ton Browning 8-C Steam Locomotive Crane.

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458 "	30"	5	1/8"	1/16"	"
1905 "	24"	5	1/8"	1/32"	"
250 "	24"	6	1/16"	1/16"	Elevator
1298 "	24"	4	1/8"	1/32"	Conveyor
250 "	22"	8	1/16"	1/16"	Elevator
210 "	22"	8	Friction		"
874 "	20"	5	1/8"	1/32"	Conveyor
1765 "	18"	4	1/8"	1/32"	"
750 "	16"	4	1/8"	1/32"	"
1509 "	14"	4	1/16"	1/32"	"
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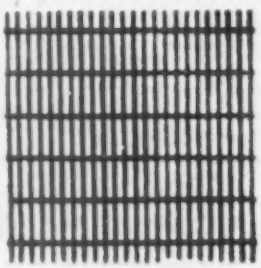

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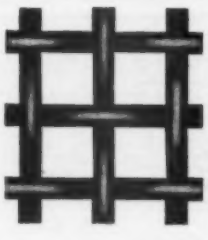

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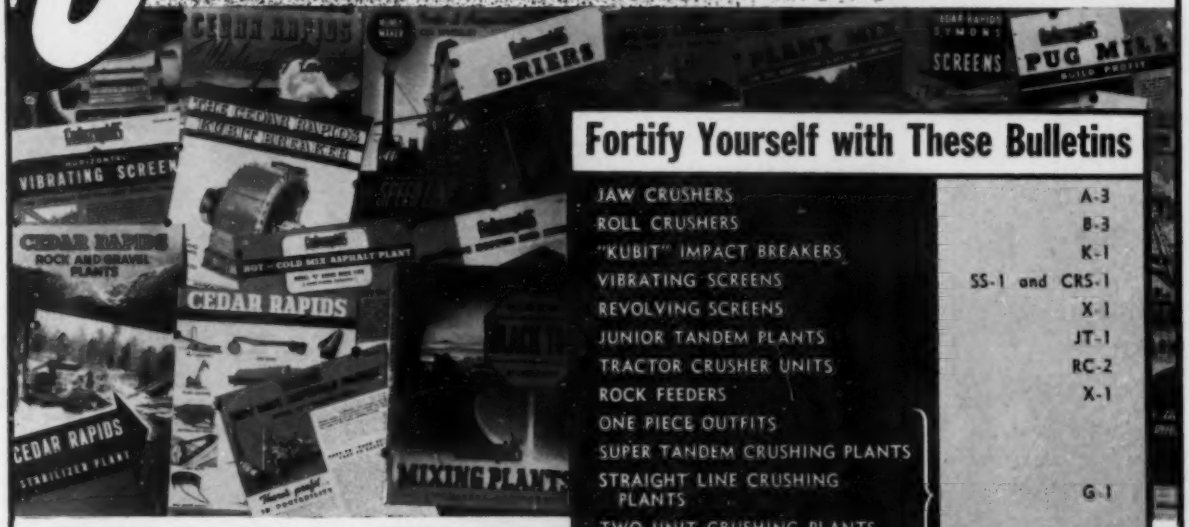

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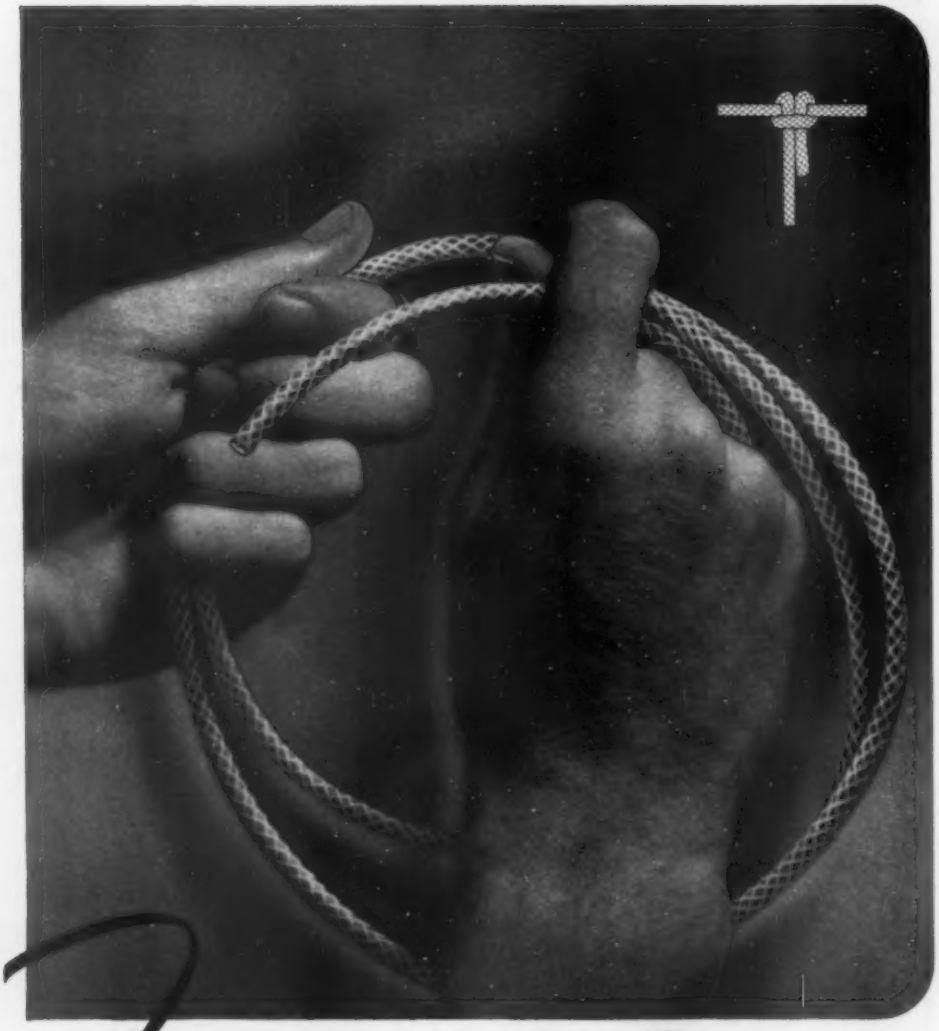

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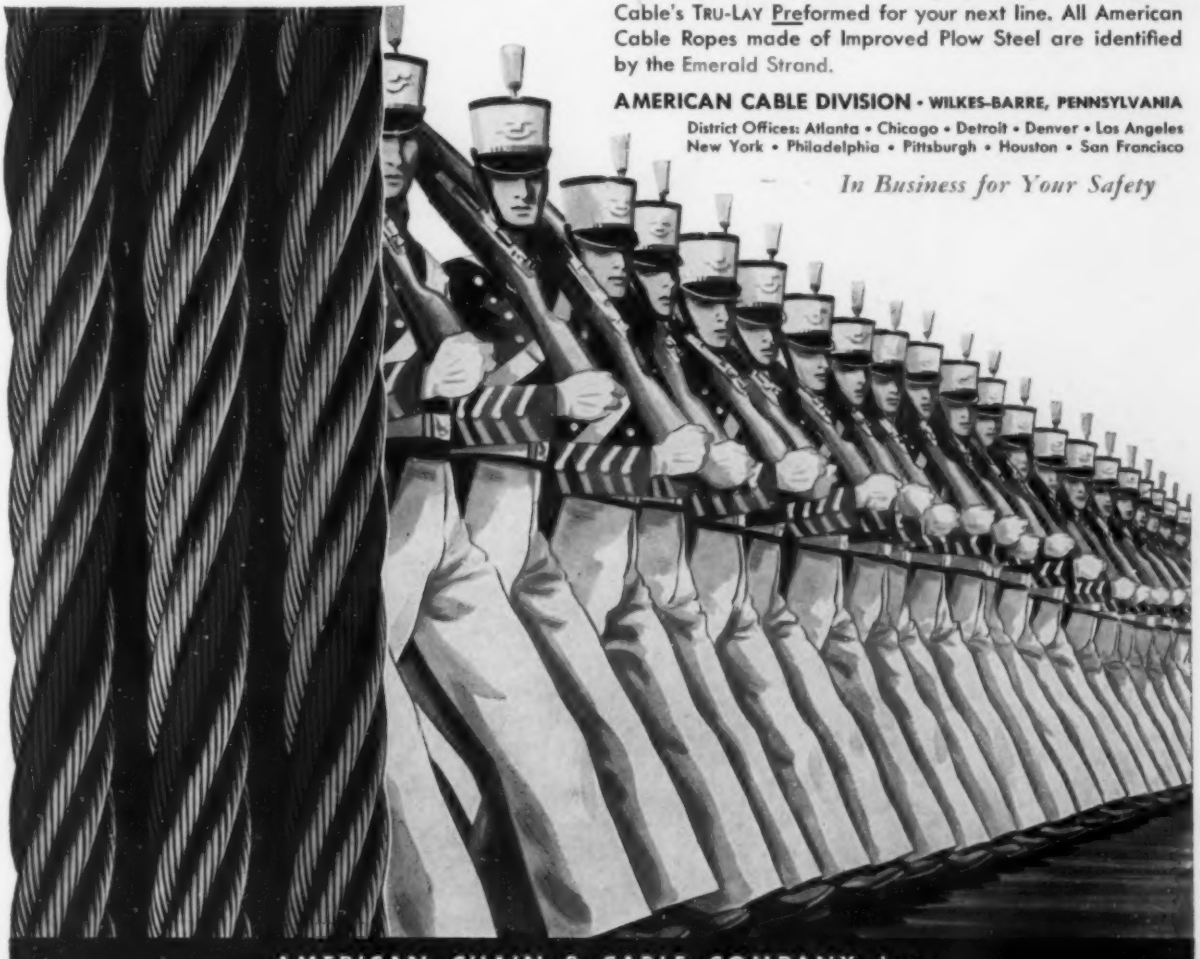

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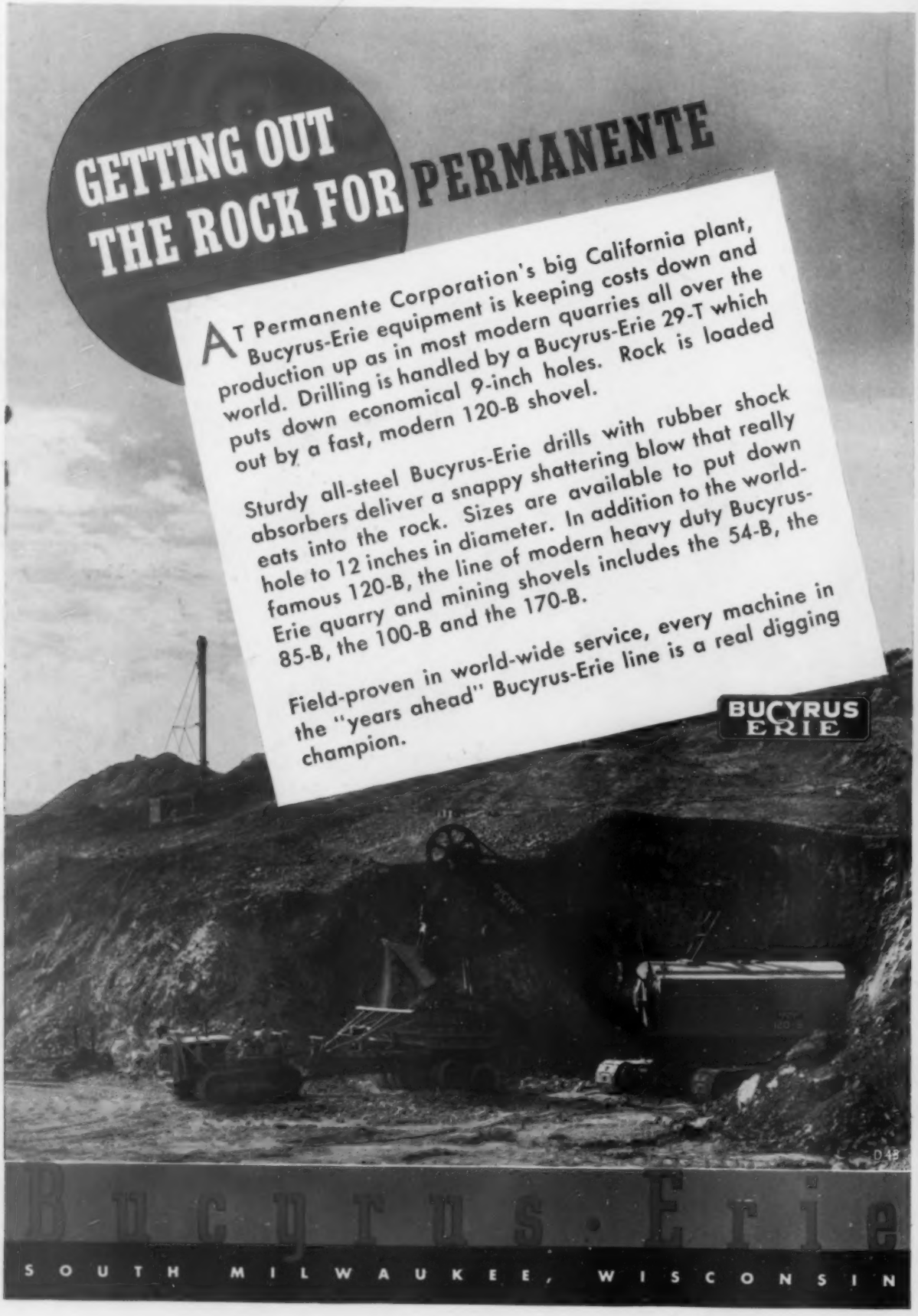
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